THE ENGINEERING AND MINING JOURNAL

The Simplon Tunnel.

The Simplon tunnel, intended ultimately to pierce the Alps between Switzerland and Italy, is the longest of the great Alpine tunnels. When completed, it will have a total length of about 12¼ miles, as against 9¼ miles for the St. Gotthard and 8 miles for the Mt. Cenis. It is distinguished from the other tunnels in the Alps by the fact that there are really two parallel tunnels, 55 ft. centers. Each tunnel will accommodate one track. The bore is straight, with the exception of an angle at either end, due at the north to the proximity of the River Rhone at the town of Brigue, and at the southern extremity to the adjacent Divernia, just below the town of Iselle.

The track at the north portal is about 2,250 ft. above sea-level. From this point the tunnel rises with a 2% grade until the apex is reached almost on line with the boundary between Switzerland and Italy. This is at 2,325 ft. elevation; the bore falls thence with a 7% grade to the southern entrance, at an altitude of about 2,100 ft. The mountain over the tunnel is 7,000 ft. in height and the thickness of rock above the tunnel at the apex is greater than in any previous work of this character.

The method adopted in carrying on the work provided for the completion of the easterly tunnel as it was driven; the floor heading of the second or western tunnel was carried along at the same time, with no attempt to complete this bore, its present use being confined to ventilation. The two bores are joined at intervals of about 650 ft. by cross-galleries or traverses. While the two tunnels will ultimately be of the same size, but one will be completed at the present time; the second will be enlarged at about the middle for a distance sufficient to permit trains to pass. When traffic increases so as to demand it, the second bore will be fully completed. The double-tunnel scheme was developed in course of construction into an effective system of ventilation. High temperatures were encountered as the work progressed, and in order to make conditions more tolerable, fresh air was forced in by powerful fans at the rate of about 1,250 cu. ft. per sec., entering heading No. 2, passing through the last traverse and returning outward through heading No. 1. Cross-galleries or traverses were closed as the work progressed, only the advance opening being kept clear. Even with such a circulation as this, it was found necessary to further reduce the temperature at the face by sprays of cold water. For this purpose a great system of refrigeration was installed. The temperature of the rock in the tunnel was 55° C., but the cooling devices maintained the air temperature at from 25 to 30° C.

The construction of the tunnel was carried on simultaneously from both ends. The heading starting on the Swiss side at Brigue, was pushed beyond the apex to a point on the Italian side about 6½ miles from the Swiss portal. At this time the Italian heading had been advanced to within about 800 ft. of the other heading, and there remained this thickness of rock to be penetrated before the mountain was pierced. At this point, in September, 1904, unexpected obstacles to further progress were encountered, necessitating the abandonment of work on the Swiss side and seriously impeding operations in the Italian heading. These were springs of hot water at 45° C., opened almost simultaneously in the two headings; those on the Swiss side flowing 489 gal. per min., those on the Italian side 960 gal. per min. The volume and temperature of this water in the Swiss heading, together with the destruction, by a landslide, of the cooling plant for that section, forced complete suspension of operations at that side. The work was completed by driving through the Italian heading, but here again operations were seriously impeded and the rate of progress cut down to a mere fraction of that normally maintained. When measurements showed that only a thin wall, which could be removed with one blast, intervened between the two headings, work was suspended until the greater part of the accumulated water on the Swiss side could be pumped out. Then the blast was fired, making an opening through which the remaining water rushed out to the Italian portal. This occurred on Feb. 24, 1905; and this date marks the culmination of the greatest tunneling enterprise ever attempted. The work was started in August, 1898.

Power for the Simplon work has been furnished by two plants of about 2,000 h. p. each, driven by water power, one at either end of the tunel. The method of tunneling was radically different from that familiar to American engineers. Instead of the compressed-air rock drills so common in American practice, the Brandt system of hydraulic rock drills was used. This operates by grinding away the rock by cutters under tremendous pressure. Instead of the familiar air-compressor plant, there were immense high-pressure pumps driven from water-wheels. The ventilating fans also are driven by water-power. The tunnel section was enlarged by hand drilling.

Compressed air was used in operating the haulage locomotives handling construction trains in the tunnels. The power-house supplying compressed air to this system was installed at Brigue, Switzerland. It contains two Ingersoll-Sergeant compressors, belt-driven from water-wheels; they are of the three-stage straight-line type, "class BC3," with water-jackets on the low-pressure cylinder, horizontal intercooler, and water-box submergence on the high and intermediate pressure cylinders. They deliver air at 1,500 lb. pressure and, at a normal rating of 140 r. p. m., each compressor has a free air capacity of 121 cu. ft. per min. at this pressure.

The continuation of this great work under the unexpected difficulties encountered called for the exercise of resource and daring on the part of the engineers in charge. The driving forward of the Italian heading, in the steaming, stifling heat from the hot water, was in itself a wearing and laborious operation without precedent. Much curiosity and apprehension was felt as to the outcome of the piercing of the dividing wall. But this was made without mishap, and since that time efforts have been directed toward enlarging, lining and completion of the tunnel.

While one of the largest and most difficult tunnels, the Simplon was by no means the most expensive. Its cost thus far, exclusive of installing charges, has been about $210 per lin. ft. In driving it 10,000 men have been continuously employed—4,000 on the Swiss side, 6,000 on the Italian section. Its length, as stated, is 12¼ miles. The section of the completed tunnel is of horseshoe shape, 13 ft. 6 in. wide at bottom, 16 ft. 6 in. at spring line, and 18 ft. high in the clear above the rails. It is lined with concrete and masonry throughout, the enormous pressure in some places calling for a lining 6 ft. thick. The heading carried forward in the second and uncompleted bore is 6 ft. 6 in. high and 10 ft. wide.

Just what power will be used to haul trains through the tunnel has not yet been made public. A recent order by the Swiss government for 160 cars with enclosed platforms seems to indicate, however, that for the present at least, steam will be used.

The International Boundary Line.

BY OUR SPECIAL CORRESPONDENT.

The work of defining the boundary line between the United States and Canada and setting bronze monuments, in concrete, from the summit of the Rocky Mountains to the Pacific coast, on the part of the United States, has been finished. E. C. Barnard, chief topographer on the division west of Idaho and across the Cascade mountains, having made his last headquarters at Loomis, Okanogan county, Wash., has returned to Washington, D. C., accompanied by his staff of engineers. The Canadian government has its part to finish between the Skagit river and the coast, which will be done as early as possible next year, when engineers in the employ of both countries will inspect the work all along the line and set the number plates in the monuments. Receptacles are cast in the monuments, and the plates, made of the same material, with the numbers countersunk in them, will be dovetailed into the receptacles made for them

Gold Dredging in Colombia.

BY J. P. HUTCHINS.*

The increasing interest manifested in properties suitable for exploitation by dredging includes the auriferous valleys of Colombia, South America. On a recent trip into this region (during the investigation of placers to be worked by the hydraulic method with gravity and pumping plants), I made an examination of deposits on the Magdalena river and its affluents, where the conditions are favorable for dredging. To chronicle the results of these observations and to deduce a set of general conclusions as to dredging probabilities, will be the object of this article.

Physical Geography.—The backbone of the Western Continent, a noble range of gneiss, granite, syenite and porphyry, parallels the west coast at a distance varying from 50 to 100 miles. Naturally, most of the rivers on the western flank of the Andes empty into the Pacific. The largest, the Atrato, finds its way in a northerly course into the Gulf of Darien, an arm of the Carribean sea. Generally paralleling the Andes (called in Colombia the Cordillera Occidental) are the Cordillera Central and the Cordillera Oriental. Between these ranges, and running in a northerly direction through deep valleys, are the Magdalena river and its affluents; their upper reaches and their flanks are characterized by lofty plateaus; swampy districts are found in the lower 200 miles of their courses. The Magdalena is 600 miles long.

The eastern flank of the Cordillera Oriental is drained by affluents of the Orinoco and Amazon rivers. It is a region of high plateaus, sloping gradually toward the east; this is little known, because of its inaccessibility, and will remain unknown and unexploited for a time; not being of present interest, it may be omitted from consideration in this article. It may be said, however, that the probabilities for the discovery of various minerals in that region are good, but any extensive developments and intensive exploitation of its resources will, of necessity, await the establishment of railroad communication. It has been stated, on good authority, that extensive alluvial deposits of auriferous gravel exist. These are said to be similar to the gravel on the Magdalena watershed.

Roughly speaking, all the rest of Colombia (about one-half its total area) is awaiting investigation and development. The Magdalena and its tributaries drain more than one-sixth of Colombia; because of physiographic, topographic and geologic features similar to those of the Magdalena system, similar favorable conclusions may be adduced as to the dredgability of the rivers of the western flank of the Cordillera Occidental.

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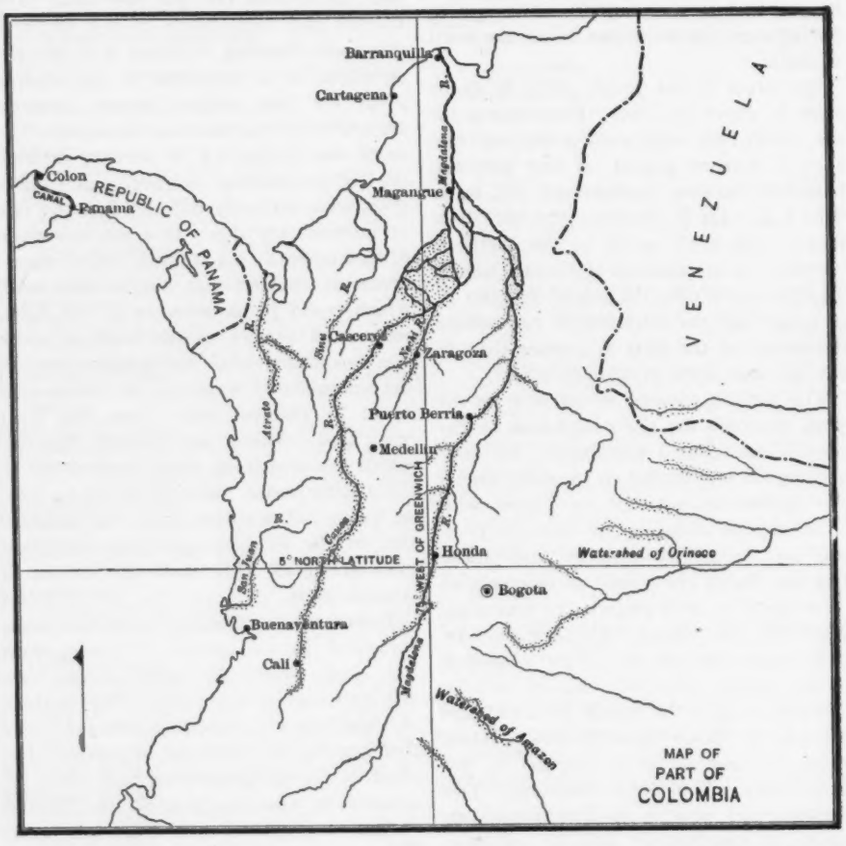
The watershed of the Magdalena is one of prodigious erosion; the corrasion and deposition of a tremendous volume of material during several geologic epochs, has formed wide alluvial plains, and a detrital delta. The auriferous alluvions extend to a considerable distance from the Cordilleras; but it is probable that, as in California, no payable gravels will be found far from these debouchments. Unlike California, however, there are plateaus in the upper reaches of the rivers where insufficient and decreasing river-gradients have resulted in the deposition of auriferous materials of dredgable depth and of probable value. This variation of gradients in a country of unique and rugged topography, has resulted in the wide distribution through a considerable area of alluvial and diluvial auriferous material. Colombia has been a Circus Maximus in absolute, an amphitheater of vast geologic dramas; and in its rugosity, he who runs may read.



Characteristics of Gravel.—The conclusion is inevitable that these alluvial areas, the result of tremendous erosions through geologic time, should offer several conditions conducive to successful dredging. The gravels, like wine, have been well aged; and as the result of long abrasion, generally have small and well rounded boulders; gold is also found in comminuted particles of great purity.

Only a cursory examination was made, but it was observed that gold in paying quantities exists in some of the gravels, from grass roots to water level. Speculation as to its presence at greater depths will at least prove interesting. There is a marked analogy between the geological histories of some of the Colombian alluvions and those of Yuba, Feather and other debouchments on the western flank of the Sierra Nevada, in California. Similarity of characteristics of peneplains, in occurrence, is patent, and other resemblances are obvious. It may then be possible that the value is not that of surface concentration, and that investigation (by shaft sinking and drilling) will prove gold at greater depth. In passing, it is interesting to note that Colombian peneplains are not deposits of extreme concentration, either laterally or vertically; thus, pay streaks are often wide and values are partly disseminated. On the peneplains of the Nechi river, in authentic cases, gravel of a tenor of more than 50c. per cu. yd. has been hydraulicked in considerable volumes; and value, in areas of concentration, has been found to be over $4 per cu. yd. Bedrocks are frequently hard-pans, called locally "bed clay," a false bedrock overlying alluvial material.

Bottom.—Bedrock, where exposed in hydraulic operation, is generally decomposed and friable, with but slight penetration of gold into it and its crevices. It will probably be found that any of the bedrocks underlying the alluvions of the areas of debouchments are soft and favorable. All the schists and shales where exposed on the river banks are much decomposed; and, when they are found in contact with the gravel of the adjacent peneplains, a

similar condition is observed. Nevertheless, deduction from analogy has been responsible for colossal failures in mining; this is dangerous practice and of doubtful utility.

The following example is given as an instance of how analogy would mislead in considering Colombian rivers, and in adjacent flats of recent origin:

In the mining of peneplains adjacent to rivers but little fossil wood is found. By analogy one might conclude that no buried logs occur in the river beds and in the other alluvion of recent origin, and where found it seems associated with areas of enrichment. However, recent timber has been encountered in dredging operations in the river beds, and is a source of lost time.

The depth to bedrock is yet to be determined, and any surmise is guesswork. As a matter of interest, it may be said that shallow, rather than deep, gravels are found nearly everywhere in the lower altitudes where hydraulicking has been done. Overburden seems of small section in most of the bank gravels. Sand-fills of a depth more than 10 ft. will probably be encountered at times in the river channels and on some of the bars.

Character of Gravel.—Large boulders are almost entirely absent from the gravels where they are visible above water on the river banks; and it can be predicted with confidence that future investigation will find few boulders below water level. The geologic history of the alluvions is such that the occurrence of any considerable number of boulders of a size troublesome in dredging operations is extremely unlikely. The presence of cemented material, occurring somewhat regularly stratified, is observable in the gravels of the river banks and in the adjacent peneplains. These strata are neither extremely hard nor thick. The gravels, even where not cemented, are not such as can be called, unreservedly, "free"; they have a tenacious character. Possibly "tenacious" is too strong; the word "stiff" may be better. Because of the great importance of this feature, some cautious discrimination is necessary in describing their degree of induration.

The gravels of the river bank cannot be called "tight," though in ground-sluicing them, bars and picks are used to break them down. Many dredging failures have been due to the indurated condition of alluvion; even recently, some dredges of new design and great power have proven unable to cope successfully with conditions where induration of gravel was the most serious. Extreme caution and unusual care are necessary in the investigation of some of the Colombian alluvions; and this feature (not necessarily a fatal one if thoroughly realized and properly appreciated) must be given consideration; it is important. The material in the river beds seems "free," but it is probable that the same conditions as those of the bank gravels will be found when the sand and loose gravel of the upper section shall be penetrated. This condition of some of the gravels can be used to advantage while the gold tenor and other characteristics are being investigated. In sinking prospecting shafts it will probably be found that the gravels are stiff enough to stand without timbering, and sufficiently compact to prevent an excessive percolation of water into them, even when pits are sunk close to the rivers.

Not much clay was observed in the gravels visible above water level. It is interesting to note that, in the hydraulicking of peneplains, no clay has been encountered in sufficient volume to prove troublesome. Some of the "bed clays" (which are the plane of lowest hydraulicking in some districts) are of such consistency as to make it necessary to avoid its getting into the sluices in any considerable quantity. Such a bottom in dredging operations (its occurrence in the river gravels and those of the adjacent flats is not unlikely) will introduce problems in the design of buckets to facilitate a quick discharge; efficient save-alls will be necessary.

A COLOMBIAN RIVER BANK.

Methods and Apparatus for Prospecting.—It is probable that shaft-sinking will prove more satisfactory in other ways than in the mere determination of value. A centrifugal pumping plant (with boiler, engine and pump units on separate wide-tired trucks) will probably be more mobile, in the tropical jungle and over the marshy surface of the flats adjacent to the river, than a drilling machine; unquestionably the moving of the latter would be difficult. For the investigation of the river bed proper, a drilling machine mounted on a scow, will be a happy arrangement. One all-important factor in the design of such a scow, is the proper recognition of the rapid fluctuations of the rivers; the modeling and construction of the bow must be suitable for swift currents which carry large quantities of heavy drift timbers of a size dangerous to any but well built hulls, with water-tight bulkheads. Dangerous snags are of frequent occurrence in most of the Colombian rivers.

Types of Machinery.—Steam dredges will probably be preferred to those electrically operated. Fuel is cheap, wood in boiler lengths being obtainable in some cases for less than $1.50 per cord on the bank. In some districts local coal may prove the most economical fuel. Usually topographic conditions are not favorable for the installation of plants for the generation of electric power near the river debouchments. There are serious obstacles to maintenance and operation of such installations, such as a redundant fauna and flora, and adverse meteorological conditions; among the latter are severe electrical disturbances and tropical tempests. Such an arrangement as that installed during the past year in the Klondike (a steam-turbine plant generating electricity at a short distance from the dredge, making transformers and long transmission unnecessary), may find favor in Colombia. However, until this type of plant shall have proved its efficiency during a sufficient time, it will be wise to avoid it in Colombia. In general, it may be said that there, more than in most countries, must simple, strong and reliable machinery of proven and undoubted worth be installed. Machine shops and foundries are hundreds of miles away; communication and transportation are slow, difficult and costly.

Tropical fauna and climate are such as to make steel hulls and gantries necessary, as timber is soon honeycombed by insects and decay. Tropical flora will introduce a serious item in operating expenses. Any investigation must contemplate (as an important feature of the prospecting) the determination of the costs of clearing ground of trees, stumps and bush. The cost of operation as effected by encountering buried timbers in the river-bed gravels, is worthy of ample consideration. Apparatus for handling such obstacles must be capable of quick manipulation and of great power. As with other vessels, dredge-hulls must be designed to cope with swift currents. Sometimes there are freshets after heavy rains, bearing tremendous quantities of drifting logs and trees of such size as to be of serious menace to any vessel. The unwieldly gold dredge—with necessarily awkward bow, divided hull, projecting ladder and partly submerged mooring lines collecting driftwood—like the prospecting hull, is in constant danger of collision. Several water-tight bulkheads, with ready means of pumping from the various compartments, will be necessary.

As simplicity of plant is an important factor, a dredge of the original New Zealand type (having only excavating, pumping and sluicing apparatus, thus eliminating the complications of screen and stacker) may prove best adapted. In some of the districts where larger boulders occur, a trommel, or some other screening device, may be found necessary.

The efficiency of the sluice-box as a gold-saving device where fine gold occurs, is much mooted; the evidence is contradictory. It may be said, however, that the extreme simplicity of such an installation (when used in conjunction with a grizzly and undercurrents, and therefore efficient as a gold-saver) has much to recommend it as a type particularly suitable for the tropics.

Transportation.—Transportation to the dredgable areas under consideration is not difficult; freights from the coast will be less than $10 per ton for properties that are located on navigable rivers. Flat-bottom river steamers regularly ascend some of the rivers, and an irregular service, such as the freight offerings may warrant, is maintained on others. In this article no particular consideration of the areas in the upper reaches of the rivers has been attempted. These were not visited, and what has been said cannot properly apply to them. However, conditions are better climatically, because of greater altitude; worse economically, because of greater inaccessibility and difficulties of transport. The manufacturers of gold dregdes are now asked to build a dredge of such size of sections as will permit of mule-back transportation. What a vista in design and construction! The higher areas are well worth serious consideration and thorough investigation.

Tropical Climate as a Factor.—Tropical climate, as affecting the working of dredges at altitudes under 3,000 ft. in the equatorial regions, is of prime importance. (See "Tropical Climate as an Economic Factor in Mining," this JOURNAL, Nov. 11, 1905, p. 870.) Any operations without a complete realization of this feature are sure to be of dubious outcome. No dredging should be undertaken without an allowance for operating costs much in excess of that proper for temperate zones. Dredging in overburdens of decaying vegetation of the rankest growth is extremely unhealthful, and the dredge staff, in addition to extra men, should include a doctor. Much good dredging ground is in the most unhealthful parts of Colombia, and men for its investigation and exploitation must be chosen with great care. Those who have been in the tropics (thus acquiring, in large degree, immunity from many complaints, and possessing a knowledge of tropical conditions and means of successfully combating them), are desirable. Teaching such men the intricacies of dredging, or, on the other hand, case-hardening to tropical climate experienced dredgemen from the temperate zone, will prove a disheartening task. Until men shall become fitted by experience as dredgemen and by residence in the tropics, dredging costs will be high and results disappointing. It may be said in general that men "experienced in tropical climate" rather than those "experienced in dredging," will be more likely to give better satisfaction in the year-to-year operation of dredges.

Labor.—The laborer of the tropics is all that he should not be; he has an efficiency less than 25%. His decalogue has become "God made day for rest and night for sleep," and in its observance he is consistent and unwavering. Believing in the common ownership of gold, he is socialistic, but he stands the climate better than the white man, and so must be used in heavy manual work. The dredge crew proper will of necessity be composed largely, if not entirely, of foreign labor. Conditions such as those in Colombia, where bountiful nature supplies large reward for a minimum of labor, are not conducive to efficiency. Climate is a potent factor; it makes the laborer of the tropics a sluggard; while he of the North, constantly battling with elemental obstacles in a stimulating climate, is, in general worth and resourcefulness, as superior to the tropical animal as the Arctic Circle is above the Equator.

Conclusions.—It has been said that there have been fourteen unsuccessful attempts to dredge the auriferous deposits of the northern countries of South America. Dredging the Magdalena was attempted more than 20 years ago. Such a record of failure is not inviting to investigation; but it is probable that dredging will be reundertaken on several of the rivers of Colombia. The success of dredging operations, however, will depend upon a thorough investigation and, to a larger degree, upon the suitability of the dredge to cope with a unique and threatening, though not necessarily fatal, set of difficulties. Efficient installation properly designed for the unusual conditions, management thoroughly cognizant of the difficulties incident to tropical environment and constantly on the alert to combat them—these are a part of the *sine qua non*. To the casual observer of Colombian dredging ground, and to the close observer of tropical conditions, tropical climate seems the most serious obstacle to successful exploitation; the importance of climate cannot be exaggerated. Failure to recognize this fact is sure to result disastrously.

Although Colombia has never had a so-called bonanza, or a great gold mine, it still ranks among the gold-producing countries. Its total production is variously stated at from 500 to 800 million dollars. Of the total production, 582 million dollars, according to the Colombian statistician, Vincente Restrepo, Antioquia is credited with $250,000,000 and Cauca with $240,000,000. When one pauses to remember that the Magdalena and its affluents drain most of Antioquia and Cauca, and that in these beds and on these banks are areas of virgin auriferous alluvions whose geologic histories have been most favorable to the deposition of gold in paying quantities, the probabilities of its occurrence in such tenor as to widen the dredging horizon to include Colombia are indeed bright.

Fig. 1 is a sketch-map of Colombia, and shows the principal rivers and several of the important cities and towns. The remarkable plexus of rivers in the vast detrital plains is noteworthy. The dotted areas indicate deposits of auriferous alluvial and diluvial material. While these deposits cover hundreds of square miles, the dredgable areas are probably but a small part of the whole. As in other countries having extensive placers, Colombia has relatively few districts where a fortunate sequence of geologic events has resulted in favorable dredging characteristics and environment.

Fig. 2 shows a bank of auriferous alluvion on the Nechí river, where the gravel found is in a strip of varying widths and depths on both sides of the river. Several favorable conditions for successful dredging obtain, possibly all that are essential.

The Royal School of Mines in South Africa.

The old students of the Royal School of Mines, resident in South Africa, held their annual dinner in Johannesburg, on Oct 7, 1905. J. Harry Johns (consulting engineer to Messrs. Barnato Bros.), presided. He was supported by A. R. Sawyer (past president of the Geological Society of South Africa), and H. H. Webb (consulting engineer to the Consolidated Goldfields of South Africa). Some 50 were present at the dinner.

Among other remarks, the chairman laid stress upon the importance of training in mechanical engineering and electricity, and congratulated the Government upon choosing a thoroughly practical engineer to fill the Chair of Mining at the Royal School of Mines, stating that, since the days of Sir Henry De la Beche, the school had always been renowned for its brilliant teaching staff, and that S. H. Cox was a worthy successor to the late Sir Clement Le Neve Foster.

During the course of the evening two interesting announcements were made: First, a letter was read from the Commissioner of Mines (H. Weldon), in which he offered a scholarship of £32, to be competed for by the mining students of the Transvaal Technical Institute. Second, Mr. Webb stated, that the Consolidated Goldfields of South Africa would always be ready to provide work for a certain number of students who had finished the graduation course at the Royal School of Mines. The students would earn sufficient at such work to maintain them while they were gaining practical experience.

In connection with the above, those who have studied at the Royal School of Mines, should they come to South Africa, are requested to send their names (with a statement of qualifications and experience) to C. B. Horwood, Rand Club, Johannesburg.

The Fairbanks District, Alaska.

Louis M. Prindle, of the United States Geological Survey (according to the Survey Press Bulletin, No. 204, Nov. 6, 1905), has recently returned from the Alaskan field. He reports that the output from Fairbanks has increased in the last years. Two years ago the gold production of Fairbanks amounted approximately to $40,000; and to more than $400,000 last year. It will be worth between $5,000,000 and $6,000,000 this year.

Fairbanks is now a thriving town of about 2,500 inhabitants; it is lighted by electricity and heated by steam. It supports three banks, one daily paper, one weekly paper, and a public school system. Business in all lines is good.

Among the most important improvements of the district is the railroad which has been built since the season of 1904. It connects Fairbanks and Chena and has been extended along Gold stream to the junction of Gilmore with Pedro creek. The railroad has already proved of great advantage to the miners and (in connection with the Government wagon road to be built from the termination of the railroad over the divide to Cleary creek) will facilitate the handling of freight.

This year's production makes the Fairbanks district almost the peer of the Nome region. The diggings at Fairbanks are mostly deep, extending to 80 or even 100 ft., so that shafts have been sunk. The gravels are frozen and mining is usually done by the "steam point" process. Work is carried on the year round. The character of the deposits makes mining more expensive here than in the Nome district, so that the profit from an equal production is not so great.

The gold from the Fairbanks district has come from Cleary, Pedro and Fairbanks creeks; the greatest of these, in point of production, is Cleary creek. Since the summer of 1904, Cleary City, a town of nearly 300 people, has made its appearance. It is situated on Cleary creek, which is a tributary of Chatanika river, itself a tributary of the Tanana. This creek is remarkable in that pay has been found along almost its entire course. At Cleary City an electrical plant is now in process of construction which will furnish light for the town and power for mining machinery.

Dome and Ester creeks, to the southwest of Cleary creek, are promising streams. Considerable work has been done on Dome creek; pay has been located at a few points. Ester creek is already a producer.

To the east of the Fairbanks region, on the tributaries of the Salchaket, prospecting is active. The main excitement is, however, in the area west of the Fairbanks district, on the headwaters of the Kantishna river, a tributary of the Tanana from the south. Gold has been found there in shallow diggings; between 700 and 1,000 people are now on the ground.

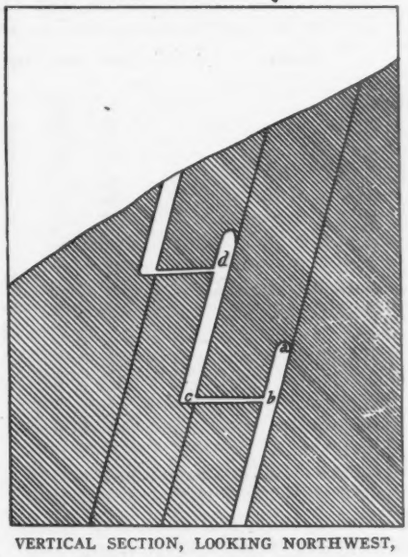
An Interesting Fault-System.

BY C. G. GUNTHER.

While in California during the past summer, the writer had brought to his attention an interesting system of faults which have been opened up in the New York mine, in Siskiyou county. Two systems of faults are here in evidence, one previous, and one subsequent, to the time of vein filling.

The vein has formed along the older system, which consists of a series of parallel faults striking northwest-southeast, and which dip steeply to the southwest. The later systems of faults are approximately parallel to the plane of the section given herewith, and are of little interest save that they have further complicated an already difficult problem.

The accompanying diagram is a vertical section taken at right angles to the vein and looking northwest. The vein, which dips to the west, has, in mining parlance, "broken back" into the hill to



VERTICAL SECTION, LOOKING NORTHWEST, TAKEN AT RIGHT ANGLES TO VEIN AND FAULT SYSTEM.

such a degree that at the 700-ft. level the drifts on it are east of its outcrop. In raising on the vein from a lower level, it was found to pinch out sudenly at the point *a*. In the hope of locating a continuation, raising was continued above *a*, slickensides and a seam of gouge continuing strongly upward. No further body of quartz was encountered, and a crosscut was driven into the hanging wall on a horizontal stringer or "floor" at *b*. This cut the vein at *c*, from which point it continued upward at its old dip and strike until at *d* a state of affairs was found to exist entirely similar to that obtaining below.

It was at first believed, very naturally, that there were two parallel veins, but exploration failed to locate the continuance of the hypothetical vein *c d* below the point *c*, or any further body of quartz *a*.

A contour of the hill on which the mine is situated would be approximately parallel to the strike of these faults, a fact which may in part explain the interesting conditions which have governed the formation of this vein.

It would seem that vein-filling solutions coming up from below followed the faults along the lines of least resistance. The easterly faults, lying further in the hill, were obviously under greater pressure than the westerly faults, consequently offering greater resistance to the passage of rising solutions. It would, therefore, seem that these solutions broke through to the west from fault to fault of the series, and produced a vein of the peculiar step-like form shown in the figure.

Extraction of Vanadium Ores.

Dr. Leon Guiller[1] describes the Herrenschmidt method as follows: The ore is vanadinite from the Santa Marta mines of Spain, and carries 14% vanadic oxide and 50% lead.

This ore is smelted in a reverberatory furnace, with carbonate of sodium and coal. Metallic lead carrying all the silver is formed, together with a slag containing vanadates, aluminates, silicate of sodium and oxide of iron. To render this slag soluble in water, it is melted in a reverberatory furnace, and, after melting, is blown with air until the vanadium is completely oxidized. The mass is then poured into boiling water to granulate it. After three leachings the residues consist chiefly of alumina, silica, and oxide of iron containing not more than 2% of vanadic acid. As, per ton of ore treated, there remains but 280 kg. of this residue, consequently 95% of the vanadic acid contained in the ore is extracted in solution.

The sodium vanadate solution does not contain any alumina, and even if aluminate of sodium be added to the solution of vanadate, the alumina is precipitated.

In order to eliminate the silica contained in the impure sodium vanadate, a certain quantity of the vanadate is evaporated to a syrup, and to it is added sulphuric acid of 66° B.; vanadic acid and sulphate of sodium is formed, but the whole of the vanadium is not precipitated; about 10% of the original content of the solution remaining. The mixture is therefore placed in contact with the solution of impure vanadium, and, after energetic stirring, it is taken to the filter press. The whole of the silica contained in the silicate of sodium is precipitated in this manner, while the vanadium remains in solution.

The alkaline solution of vanadate, thus freed from silica, contains no other impurities. It is concentrated, and the vanadium is precipitated by an excess of sulphuric acid. It is evaporated to dryness to drive off the excess of sulphuric acid, and then washed. Vanadic acid of 92 to 95% purity is thus obtained, with 5 to 8% of foreign matter.

[1] Address to the Iron and Steel Institute, Sheffield, Sept. 26, 1905.

Fatal Accidents in Coal Mining in 1904.

BY FREDERICK L. HOFFMAN.

The annual record of fatal accidents in American coal mines for 1904 indicates no improvement, but rather the reverse. In the aggregate the number of lives reported to have been lost is returned as 1,999, but if allowance is made for States not reporting, for small mines not required to report, and for deaths resulting from serious injuries after a lapse of time, it is safe to estimate the total for 1904 at 2,200 deaths. The incompleteness of the tables herewith presented is, as usual, due to the failure of a few States to furnish reports of the number of fatal accidents during the preceding year, but the omissions are not of serious importance. It is very difficult to understand why so simple a statistical item as the number of deaths due to mining casualties should not be promptly given to the public and the press within a few weeks after the close of the year; and the useful character of this information is materially impaired by what appears to be largely a needless delay.

The fatal accident rate in American coal mines during 1904 was 3.38 per 1,000 employees, against an average of 3.03 for the decade 1895-1904. The rate was higher than during the preceding year, which was estimated upon the returns then available at 3.19, but which, by the revised returns, was 3.14 per 1,000. The relative mortality due to fatal accidents in coal-mining operations remains unreasonably high. A careful study of the general facts and of the causes of accidents warrants the view that the loss, not only in life and health, but in the waste of human experience which had been gained by slow degrees and at great cost to both the individual and society, is much greater than it should be. Every year brings increasing knowledge regarding the causes of coal-mining accidents and the methods by which such accidents can and ought to be prevented in a large number of cases. Nor is enough attention paid to individual accidents, and the loss of a single life is generally passed over as being of small importance. Only the larger calamities, as a rule, attract public attention and receive serious consideration in the official reports of mining inspectors. As was said in a previous review, "The prompt issue by every State of a return of the annual loss of life would, no doubt, do much to attract public attention and prove helpful in devising necessary measures and methods of reform." This is particularly true for States where biennial reports are required to be made to the legislatures, and where, therefore, the publication of the returns is often very much delayed.

According to the method which I have followed for a number of years, I present the general facts in four tables, of which the first shows, by States and Provinces, the actual number of persons killed in coal-mining operations in the United States and Canada during each of the years 1895-04. The returns for 1903 have been revised and brought down to date. A proper distinction is made in the returns for Pennsylvania, showing, respectively, the number of persons killed in the anthracite and bituminous regions.

According to table A there have been 1,999 deaths in coal-mining operations during the year 1904. For Maryland the returns for 1904 are not available, and for Kansas the returns are only for the first six months, on account of a change in the rendering of the annual reports. Otherwise the table is complete. In estimating the probable death rate for the year, proper allowance has been made for these facts. As has been pointed out in previous years, the actual number of deaths due to fatal accidents in coal-mining operations is probably from 5 to 10% larger than as indicated by the official returns. It is significant to find that in the course of the ten years under review the actual number of deaths from accident has practically doubled. This, of course, is due in part to the employment of a larger number of miners, and in part to a larger coal output, but to a not inconsiderable degree to the more hazardous character of mining operations.

In table B allowance is made for the number of persons employed, and the rates have been calculated in the usual manner upon every thousand persons at work. While this method of reporting the relative mortality is subject to criticism in that allowance is not made for the time the miners were actually at work, or for variations in hours of labor, or other differences in conditions, it commends itself as being of the greatest practical utility, particularly in comparisons with the accident frequency in other occupations. Excepting years with great strikes extending over months at a time, as was the case in Pennsylvania in 1902, the method followed is the most useful, accurate, and best adapted for the practical purpose for which statistics of this character are required.

The relative rate of 3.38 for 1904 was 0.24 per 1,000 in excess of the rate for the preceding year, but 0.11 below the rate for 1902. Compared with the average for the decade, the rate was 0.35 per 1,000 in excess, or 11.5%. Had the rate during 1904 been the same as during the whole period under review, there would have been 15,763 deaths, against 14,124 actually occurring. The rate was higher during 1904 than during the decade as a whole in Alabama, Colorado, Illinois, Indiana, Kansas, New Mexico, Ohio, and in both the anthracite and bituminous coalfields of Pennsylvania. The largest increase, actual as well as relative, was in Colorado, which during 1904 experienced a rate of 8.26 per 1,000, as compared with 3.38 for the North American coalfields as a whole. The rate for British Columbia was 8.31, which was below the average for the decade, but the highest rate for any coalfield included in this review.

TABLE A. NUMBER OF PERSONS KILLED BY ACCIDENTS IN COAL MINES OF THE UNITED STATES AND CANADA, 1895-1904.

States.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1895-1904.
Alabama	38	28	38	45	40	37	41	50	57	84	458
Colorado	23	68	35	24	41	29	55	73	40	49	477
Illinois	75	77	69	75	84	94	99	99	156	157	985
Indiana	23	28	16	22	16	18	24	24	55	34	260
Indian Territory	6	12	22	17	25	40	44	60	33	30	289
Iowa	20	22	21	26	20	29	26	55	21	31	271
Kansas	10	12	6	17	16	22	26	27	36	16*	188
Kentucky	8	6	12	6	7	17	21	19	25	19	140
Maryland	9	6	5	4	5	7	12	11	13	..†	72
Missouri	13	16	8	9	14	10	15	10	17	11	123
New Mexico	28	7	7	7	15	15	9	17	17	15	137
Ohio	52	41	40	52	57	68	72	81	114	118	695
Pennsylvania (Anthracite)	421	502	423	411	461	411	513	300	518	595	4,555
Pennsylvania (Bituminous)	156	180	150	199	258	265	301	456	402	536	2,903
Tennessee	37	22	10	19	20	10	53	226	26	28	451
Utah	1	3	3	3	..	209	10	8	7	9	253
Washington	35	8	7	9	45	33	27	34	25	31	254
West Virginia	83	65	62	90	89	141	130	120	159	140	1,079
British Columbi	10	9	6	7	11	17	102	139	42	37	380
Nova Scotia	9	8	7	7	19	21	14	19	31	19	154
Total deaths	1,057	1,120	947	1,049	1,243	1,493	1,594	1,828	1,794	1,999	14,124

* Returns for the first six months of 1904.
† 1904 returns not available.

The rates for all the far western States and Territories continue high, but particularly so in Washington (6.69) and New Mexico (7.61). On the assumption that a rate of 2 per 1,000 is a fair average and should not be exceeded under normal conditions, only four States conform to this standard, namely, Iowa, with a rate of 1.90; Kentucky, 1.37; Missouri, 1.47; and Nova Scotia, 1.63. The table illustrates the precarious character of coal-mining operations and the necessity for the utmost vigilance and care in protecting the life and health of miners, as well as the property of the owners. While these statistics afford no insight into the actual loss or destruction of property due to coal-mining accidents, there can be no question but that this loss must amount to a very considerable sum during the

course of a year. Even, however, after allowance is made for the human element and the value of careful inspection and obedience to rules and regulations governing safety in mining, there remains a true accident element, illustrated in calamities of an exceptional character, by which the rate for individual years is raised many times above the average for a long period. This is best illustrated in the rates of 16.88 for New Mexico in 1895, of 138.96 for Utah in 1900, of 13.60 for Washington in 1899, and of 25.67 and 34.65 for British Columbia in 1901 and 1902, respectively.

In the aggregate, during the ten years under review, 14,124 lives have been lost; but this number is, undoubtedly, below the actual figures, and it is more likely that at least 15,000 lives, if not more, were lost on account of coal-mining operations during the decade. On the basis of an earlier statement that a fatal accident rate of 2 per 1,000 is not an unreasonable standard to assume for the purpose of comparison, approximately 5,000 more lives were lost than would have been the case had a normal fatal-accident rate prevailed in the North American coalfields during the past ten years.

A further comparison of the coal-mining accident statistics for recent years is made in the usual manner in table C, showing the average number of fatal accidents and the corresponding rate per 1,000 employed, during the five-year period 1899-03 and the year 1904. In other words, assuming that fairly normal conditions in coal-mining operations are represented by a five-year period, it is of interest to note how far a single year represents a variation from the standard.

The table shows that the average mortality rate during the five years referred to was 3.23 against 3.38 per 1,000 during 1904. Upon this basis of comparison, there was a decrease in the rate in Alabama, Indian Territory, Iowa, Kentucky, Missouri, Tennessee, Utah, Washington, West Virginia, British Columbia and Nova Scotia. There was an increase in the rate in Colorado, Illinois, Indiana, Kansas, New Mexico, Ohio, and in both the anthracite and bituminous regions of Pennsylvania. In other words, nearly all the more important coalfields exhibit a less satisfactory condition regarding health and life during 1904 than during the preceding five years. Had the five-year average fatality rate prevailed during 1904 there would have been 1,903 deaths against 2,015 actually occurring.

For ready comparison the data have been brought together for individual years beginning with 1890, in continuation of previous annual reviews on this subject, to enable the reader to compare the fatal accident rate of coal-mining employees with the accident risk in other employments.

It is brought out by table *D*, that while the average fatality rate during the first five years was 2.64 per 1,000, the rate increased to 2.67 during the next five years, and to 3.30 during the last. The table would indicate a distinct tendency toward a greater accident liability and an absence of forces or conditions making for a material improvement. Whatever causes may lie at the root of this problem, there can be no question but that the large introduction of foreign labor, including a considerable proportion of men unable to speak or understand the English language, has introduced a class of labor most likely to suffer serious injury or death because of indifference to established rules and regulations providing for safety in mining operations.

The problem of effective mine supervision and accident prevention is, at best, a most serious one. For illustration, let us take the recent accident at the Braznell Coal Company's mine, in Pennsylvania, where an explosion of gas caused a loss of eight lives. While searching parties were trying to recover the bodies, according to the New York *Sun*, of Nov. 17, 1905, they found the bodies of six other miners, who had lost their lives by an explosion in the Clyde mine of the same group on Oct. 14. Since Oct. 11 there have been four explosions in this group of mines, with 21 fatalities. On Oct. 11, at the Hazel Kirk mine, there were two fatalities; Oct. 14, at the Clyde mine, six were killed; Oct. 30, at the Hazel Kirk mine, five were killed; Nov. 15, at the Braznell mine, eight were killed. As to whether the responsibility in cases of this character rests upon the unchangeable geological conditions of the mine itself, or upon the management, or upon the miners, will probably never be decided to the satisfaction of all concerned. Year after year mine inspectors call attention to facts of serious importance, supplemented by suggestions for improvements and a betterment of existing conditions; but as shown by the preceding tables, the tendency is rather toward a higher fatality rate than toward an improvement. I cannot do better, perhaps, than to emphasize the teachings of the statistics of coal-mining accidents by a few extracts from the reports of last year, which are well deserving of most careful and serious consideration.

C. J. Norwood, chief inspector of mines of Kentucky, refers to the subject as follows: "It is a waste of time to indulge in fine distinctions as to responsibility. The point is that men are being killed, and many more seriously injured, by the falls of top at a rate that the ordinary risks of coal mining, with our tonnage, do not justify, and the thing for every mine manager to do is to take up the question and make earnest, vigorous efforts to lessen the dangers from bad roof. While more frequent inspections (were they made possible) would doubtless tend to lessen the evil, after all whether there shall be a reduction of roof falls to the minimum largely rests with the mine management and the miner. There must be wise mine rules vigorously enforced, diligent attention to the condition of the roof on the part of mine officials; and acute appreciation of the danger which threatens, when the roof is not properly supported, on the part of the miner."

John D. Jones, State coal-mine inspector of Colorado, in explaining the very material increase in coal-mining accidents in his State during 1904, as compared with 1903, states that: "In 1903 the rate of fatal accidents was very low in comparison with that of former years, but in 1904 the fatalities were above the average, which is to be deeply deplored, and is attributed directly to the fact that thousands of the miners filling the places of the strikers were unfamiliar with coal mining in Colorado. Over two-thirds of the accidents were caused by falls of rock and coal, which in many instances could have been avoided by proper timbering. I regret to have to state that in all such cases the investigation showed that a suitable

TABLE B. FATAL ACCIDENTS IN COAL MINING IN THE UNITED STATES AND CANADA. NUMBER OF PERSONS KILLED PER 1,000 EMPLOYED, 1895-1904.

States	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1895-1904
Alabama	4.61	2.83	3.07	4.55	3.10	2.59	2.90	2.79	2.94	4.71	3.56
Colorado	3.05	10.07	4.99	3.23	5.60	3.99	6.88	8.11	3.89	8.26	5.86
Illinois	2.35	2.33	2.04	2.14	2.27	2.39	2.24	2.15	3.13	2.87	2.43
Indiana	2.92	3.94	2.00	2.63	2.07	1.82	1.98	1.83	3.64	2.70	2.55
Indian Territory	1.64	3.26	6.34	4.82	6.24	7.59	8.35	9.62	5.42	3.63	5.84
Iowa	1.8	2.62	2.45	3.38	2.49	2.22	1.97	4.23	1.59	1.90	2.41
Kansas	1.11	1.36	0.71	1.96	1.57	2.06	2.28	2.70	3.61	3.09*	2.03
Kentucky	1.02	0.79	1.55	0.67	0.83	2.06	2.14	1.58	1.85	1.37	1.43
Maryland	2.30	1.58	1.17	0.89	1.08	1.32	2.23	1.99	2.29	....†	1.67
Missouri	1.84	2.43	1.22	1.22	1.80	1.31	1.63	1.09	1.85	1.47	1.57
New Mexico	16.88	4.87	5.13	3.71	7.98	7.44	4.81	10.11	7.26	7.61	7.56
Ohio	1.79	1.44	1.39	1.77	2.03	2.14	2.15	2.16	2.75	2.57	2.08
Pennsylvania (Anthracite)	2.93	3.35	2.83	2.89	3.28	2.86	3.47	2.03	3.41	3.69	3.08
Pennsylvania (Bituminous)	1.83	2.14	1.72	2.27	2.82	2.43	2.56	3.37	2.65	3.45	2.63
Tennessee	7.23	3.37	1.58	2.43	2.60	1.15	6.10	25.80	2.69	2.81	5.69
Utah	1.49	4.35	4.17	4.38	....	138.96	5.81	3.24	3.21	4.06	18.11
Washington	12.38	2.98	2.48	2.70	13.60	7.79	5.59	7.83	5.13	6.69	6.70
West Virginia	3.97	2.68	2.89	3.86	3.55	5.03	4.01	3.78	4.03	3.08	3.69
British Columbia	3.42	3.27	2.47	2.34	2.91	4.22	25.67	34.65	9.85	8.31	10.67
Nova Scotia	1.55	1.33	1.35	1.56	3.39	3.17	1.83	2.36	2.79	1.63	2.13
Total	2.67	2.79	2.34	2.59	2.98	3.24	3.24	3.49	3.14	3.38	3.03

* Returns for the first six months of 1904.
† 1904 returns not available.

supply of timber or props was at hand, and that often instructions had been given by the mine boss to the miner, just prior to the accident, to timber his place, and compliance promised, but postponed."

William Cameron, mine inspector for the Indian Territory, in his report for the year ending June 30, 1904, makes the following observations regarding the causes and conditions responsible for the high ratio of fatal acidents in the Indian Territory: "In searching for the cause of the increase in accidents from falling roof, I have made up an extra table showing explicitly the origin of such accidents, and by looking at this table on one of the following pages, it will be readily seen that only a very few of the number are or could be classed as unavoidable accidents, and from the character of the roof and steep pitch of the coal in this Territory it is not probable that the proportionate number of accidents of this class can ever be materially reduced by the utmost care on the part of either employer or employee.

"In regard to the far larger number of accidents under this head and which are preventable by the use of proper care on the part of the miner, it may be said that years of experience and frequent escapes from danger and minor injuries seem to have but little effect or warning on the old and practiced miner, who is at least as often found on the list of the killed or injured as the man of less experience. Familiarity with this danger seems to breed contempt or indifference, and many of the most expert coal miners will linger under a dangerous piece of rock, or fail to set a needed prop, or to take down the faulty rock while he hurries to complete the filling of a half-loaded pit car, that he may forward the work of the day at the risk of life and limb."

James W. Paul, chief mine inspector of West Virginia, in the twenty-second annual report of his department, observes that: "A very large percentage of the accidents were due directly to carelessness on the part of the persons injured or killed. A personal investigation into a number of fatal accidents would almost lead to the belief that they were deliberate suicides."

Mr. Paul further observes that: "Carelessness of a criminal nature is the direct cause of many accidents of this kind. This condition of affairs is brought about in many instances by reason of the inexperience of the employee. Greater care exercised by the mine foremen would result in less accidents from this cause, or if timbering should be conducted in a systematic manner."

These observations are emphasized by a series of exceptionably valuable statistical tables and descriptions in detail of each accident, fatal or otherwise, occurring in the mines of West Virginia during the year under review.

Finally, James E. Roderick, chief of the Department of Mines of Pennsylvania, from his large experience in an exceptional field, confirms the view of the authorities previously quoted, in the following concluding sentence of his observations on accidents in the anthracite coalfield during 1904: "Every year when the accidents that occur in and about the coal mines are analyzed, it is found that the responsibility rests to a great extent with the victims themselves. Of the 595 lives lost during the past year in and about the anthracite mines, 282, or 47.39%, were lost through the negligence of the victims, 56, or 9.41%, through the negligence of other persons. In the case of 53, or 8.91% of the accidents, the responsibility cannot be determined, and the remaining 204, or 34.29%, are classed as unavoidable. These figures are truly a sad commentary on the supervision and carefulness of the persons most interested—the operators, superintendents, foremen and miners."

TABLE C. FATAL ACCIDENTS IN COAL MINES IN THE UNITED STATES AND CANADA. COMPARISON OF 1904 WITH FIVE PREVIOUS YEARS.

States.	No. of Persons Killed, Yearly Average.		Rate per 1,000 Employed.		Increase or Decrease per 1,000 Employed.
	1899-1903.	1904.	1899-1903.	1904	
Alabama	45	84	5.86	4.71	— 1.15
Colorado	48	89	5.68	8.26	+ 2.58
Illinois	106	157	2.46	2.87	+ 0.41
Indiana	27	34	2.36	2.70	+ 0.34
Indian Territory	40	30	7.52	3.63	— 3.89
Iowa	30	31	2.50	1.90	— 0.60
Kansas	25	32*	2.43	3.09	+ 0.66
Kentucky	18	19	1.71	1.37	— 0.34
Maryland	10	..†	1.81	.. †	....†
Missouri	13	11	1.53	1.47	— 0.06
New Mexico	15	15	7.46	7.61	+ 0.15
Ohio	78	118	2.28	2.57	+ 0.29
Pennsylvania (Anthr.)	441	595	3.00	3.69	+ 0.69
Pennsylvania (Bitum.)	336	536	2.78	3.45	+ 0.67
Tennessee	67	28	7.70	2.81	— 4.89
Utah	47	9	26.02	4.06	—21.96
Washington	33	31	7.60	6.69	— 0.91
West Virginia	128	140	4.08	3.08	— 1.00
British Columbia	62	37	15.50	8.31	— 7.19
Nova Scotia	21	19	2.66	1.63	— 1.03
Total	1,590	2,015	3.23	3.38	+ 0.15

* For Kansas the returns for 1904 are estimated for the last half of the year.
† Returns not available for 1904.

TABLE D. FIFTEEN-YEAR RECORD OF FATAL ACCIDENTS IN COAL MINES OF THE UNITED STATES AND CANADA, 1890-1904.

Years	Employes	No. killed	Accident Rate per 1,000 Empl'yd
1890	288,205	701	2.43
1891	325,840	1,076	3.30
1892	342,744	859	2.51
1893	382,133	965	2.53
1894	385,579	957	2.48
1895	395,549	1,057	2.67
1896	401,874	1,120	2.79
1897	405,433	947	2.34
1898	405,600	1,049	2.59
1899	416,596	1,243	2.98
1900	460,670	1,493	3.24
1901	492,529	1,594	3.24
1902	524,028	1,828	3.49
1903	571,061	1,794	3.14
1904	590,284	1,999	3.38
1890-94	1,724,501	4,558	2.64
1895-99	2,025,052	5,416	2.67
1900-04	2,638,572	8,708	3.30
1890-04	6,388,125	18,682	2.92

Mr. Roderick's observations are emphasized by the conclusions of James Martin, inspector for the seventh anthracite district, comprising Luzerne county, who, in his report for the same year, remarks: "I regret to report an increase of 24 fatal accidents. This increase in a great measure was due to the mistakes or carelessness of two engineers, whereby 14 persons lost their lives. An account of these two accidents accompanies this report. An official investigation of the other accidents shows that at least two-thirds of them were caused by the carelessness of the victims or co-employees. This in a great measure may be attributed to the ignorance or the unskillfulness of a number of the victims themselves. I have discovered that no matter how often the officials visit the working places, they will always find someone working in danger who needs to be warned, and often severely reprimanded for carelessness. One of the most fruitful causes of accidents, and one it seems where the greatest risks are taken, and the greatest carelessness is shown, is fall of coal and rock. Often the miner neglects to stand a prop under a bad piece of rock or coal, which he should have done. His only reason that he has not done so is because it would be in his way while loading the car, and thereby cause him a little extra work; and often before the car is loaded the piece falls, and possibly he and his laborers have paid the penalty of his neglect with their lives. Then, again, there is often a piece of coal or rock hanging and it is drawn considerably, so much so that the miner believes it is not safe, and he and his laborers get drills, and often iron or wooden rails, and put over it and try to pull it down and fail, and they go back to work again under it and say it is safe and it will not fall; but sometimes they make a mistake, and for such mistakes they often lose their lives or are badly crippled."

I have thought it worth while to depart from my usual custom of merely presenting the annual accident statistics to those interested in mines and mining, by giving these extracts from official reports, since the consensus of opinion of men directly in charge and largely responsible for the occurrence or prevention of mining accidents, must necessarily have more weight than a bare statement of facts, however significant and convincing. Only those who, in the light of large experience, have gained an insight into the perplexing problems of mine-accidents prevention can appreciate the real difficulties confronting those who most desire to bring about a better state of affairs. They, better than anyone else, know how much depends upon true accidental conditions, over which the mind of man can never expect or hope to exercise control. Thus, two of the

worst acidents of the year in the seventh anthracite district of Pennsylvania were due to engineers losing control of their engines. No law, legislation, or method of inspection, as far as the facts are understood, could have prevented the two accidents in question. Again, in the Carbonado colliery of British Columbia, 14 men lost their lives by an outburst of gas, which filled the level with coal for 400 ft. The foreman had reported everything clear and quiet at the face 20 minutes before the outburst. The level, however, had not been working for two weeks, and the outburst was assumed to have come from the counter level above, or from the incline, which was also full of coal. It is easy to criticize fatal accident returns in the aggregate, and easy to advance theories and conclusions as to how the mortality could be or should be diminished; but when the individual cases are subjected to a critical analysis and expert judgment, the problem of accident prevention remains one of the most serious and perplexing in coal-mining operations.

Assay of the Platinum Metals.

Dr. Nordenskjöld (*Oesterreichische Zeitschrift für Berg- und Hüttenwesen*, 1905, p. 473) describes some analyses which he carried out as examples of a method, which, although not new, does not appear to be well known, and which is more rapid than the ordinary methods.

To determine platinum (by itself), an excess of magnesium is added to the rather dilute sample solution, and the latter is heated on the water bath. Theoretically there is required about 17 cm. of magnesium ribbon (of ordinary thickness) per gm. of Pt. A little more than this is added, however, and the excess is removed with hydrochloric acid. There is a tendency for some magnesium oxychloride to form; this is insoluble in water, but is easily soluble in acid. Its formation may be prevented by adding, at the start, a few drops of hydrochloric acid.

Two determinations actually performed by this method gave 118.6 and 119.6 mg., respectively, Pt in 20 c.c. of a given solution; a check estimation (made by reducing with sodium formate) showed 119.0 mg. of platinum.

To test whether the Pt has been completely precipitated, add to the filtrate a few drops of ammonium sulphide and acidify: this should not cause any colored precipitate.

In the case of the other metals of the platinum group, the analysis is a little more complicated. Iridium, ruthenium and rhodium, when freshly precipitated, are somewhat soluble in acids, therefore, a complete precipitation can never be obtained in acid solution, neither can the excess of magnesium be removed without a partial dissolving of the platinoid metals. It is therefore best to add the magnesium little by little, so that the least possible excess finally remains. The precipitate always contains a little magnesium oxychloride; this cannot be removed, as it is not permissible to acidify; therefore it must be ignited along with the rest of the precipitate. This magnesium can then be dissolved out with acid, as iridium, ruthenium and rhodium are quite insoluble in acids after ignition.

However, the precipitate thus obtained cannot be simply ignited in air, as it would absorb oxygen on cooling. In some analyses of samples (furnished by the firm, Heraeus), the results of which are given herewith, the precipitate was ignited first in air, then in hydrogen, and was finally allowed to cool in CO_2. In 20 c.c. of solutions containing, respectively, Ir, Ru and Rh, there were thus found: Precipitating with formic acid, 53.6 mg. Ir; precipitating with Mg, 53.9 mg. Ir; with formic acid, 39.8 mg. Rh; with Mg, 40.1 mg. Rh; with Mg, 40.4 mg. Rh; with formic acid, 56.0 mg. Ru; with Mg, 55.3 mg. Ru. Therefore, the two methods give concordant results.

With magnesium, the entire group of platinum metals may, of course, also be precipitated together. The Pt and Pd may then be dissolved out with aqua regia, which, even when dilute, attacks them at the temperature of the water bath. However, care must be taken not to ignite the precipitate too strongly; otherwise alloys may be formed, from which the Pt is not entirely dissolved. The ignition is best carried out over the bunsen, not over the blast-flame.

A platinum ore from the Ural (containing Os, Pt, Au and Fe, and sand), was analyzed as follows: After treating with hydrofluoric acid (to extract the SiO_2), the sample was leached with strong hydrochloric acid to dissolve the iron; it was finally digested with aqua regia. The solution contained all the free Pt (perhaps Pd also) and all the Au. The osmium-iridium was slightly attacked, and a little Ir was dissolved, while a small quantity of Os was oxidized to osmic acid, which is volatile and which escapes on boiling the aqua regia solution.

After expelling the aqua regia (by repeated evaporation), the Au was precipitated with SO_2. By special test it was shown that the Au could be completely separated from the Pt in this way. The violet precipitate settled in 24 hours, and was filtered off. The solution (saturated with SO_2) was allowed to stand for another 24 hours; and the very slight second precipitate formed was added to the first. The SO_2 was expelled by boiling; the solution precipitated with magnesium, and the precipitate dried on the filter. A portion of it was oxidized with nitric acid, and treated with ammonia. The platinum metals were thus precipitated as insoluble double-chlorides. In the filtrate, no metallic precipitate was produced by Mg; therefore, Rh (whose double-chloride with ammonium is soluble) was absent. The precipitate of double-chlorides was then dissolved in hot water, and the metals were re-precipitated with Mg; the precipitate ignited and added to that from the first operation. The powder was then treated with aqua regia, thus separating Pt. The insoluble residue (only a few milligrams in weight) was not examined for Ru, but was assumed to be pure Ir. The platinum solution was precipitated with Mg, and the precipitate treated for a long time with nitric acid, to separate any Pd present; but the weight remained constant, showing absence of Pd.

After deducting the SiO_2, Fe, Au, Pt, Ir and the insoluble residue from the weight of the original sample, the difference was put down as volatilized osmium. The insoluble residue (together with the volatilized Os, and the Ir separated) was regarded as osmium-iridium; this represents the most valuable constituent of the ore, and formed the main object of the analysis.

From two separate samples there were obtained the results given herewith.

	No. 1.	No. 2.
Weight of sample.....	1805.8 mgm.	1139.2 mgm.
Osmium-iridium.....	81.5%	80.2%
Platinum.....	14.0%	13.9%
Gold.....	2.6%	3.9%
Iron.....	1.7%	1.8%
Silica.....	.2%	.2%

The discrepancies between these two analyses (especially that in the value for the Au) were chiefly due to lack of uniformity in the samples, the material of which was coarsely granular.

W. G. Mixter, in *Am. Jour. of Science*, 1905, XIX, 434-444, reports that the carbon formed by the incomplete conbustion of acetylene is dull and porous. It is a good conductor of heat and electricity. One gram of it is capable of condensing 1 mg. of dry air on its surface and in its pores, but it exercises no catalytic effect on gas reactions. It has 1.919 sp. gr. at the ordinary temperature. Its heat of combustion at constant pressure and volume at 20° C. is 7,894 calories. Its heat of combustion is thus almost the same as that of graphite, but it does not contain graphite.

The Morgan Crucible Co., Ltd., and C. W. Speirs, London, English patent 9875, May 10, 1905, describe a process wherein plumbago, crystalline or flaked, such as that from Ceylon, is ground to pass through a 100-mesh sieve, and is compressed in molds under pressure of not less than 20 tons per sq. in., with suitable direction of the plane of pressure to the purpose for which the blocks are intended. For commutator brushes, for instance, the lines of stratification should run in the direction of flow of the current, while for wearing surfaces the planes of stratification should be at right angles to the wearing surface.

Some Timiskaming Ores.

BY PHILLIPS THOMPSON.

The silver-cobalt-nickel-arsenic ores of northern Ontario are attracting no little attention; and, on account of this interest, the paper by Professor W. G. Miller thereon (a part of the forthcoming fourteenth Report of the Ontario Bureau of Mines) has been issued in advance copy. This article is substantially taken from Professor Miller's report. The volume will also give much detail regarding the mining industry of Ontario.

The introduction of the report notes the great variety of economic minerals produced in the tract known as "the Archean protaxis." This rugged region stretches away from the St. Lawrence river, and expands to the northwest, occupying a large part of northern Ontario. Among other deposits it includes the Sudbury nickel mines, the corundum deposits of North Hastings, the feldspar and mica of Frontenac country, and the iron ranges of northwestern Ontario, the latest addition to the list being the orebodies of the Cobalt area, which carry silver. cobalt, nickel and arsenic.

In a brief treatise on the discovery of these deposits in 1903, as a result of the construction of the Timiskaming & Northern Ontario railway, Professor Miller stated that little interest was aroused at the time, the character and value of the ore not being recognized. Thomas W. Gibson, director of the Bureau of Mines, received a specimen of niccolite, which was supposed to be copper ore. Recognizing its value, he asked Professor Miller to report on the occurrence as soon as possible. While niccolite has been found in association with the lower-grade nickel ores in the Sudbury region, though in no great quantity, the Sudbury ores are quite different in character and origin from those of Cobalt, though nickel is a constituent in both. Nearly all writers who have reported on the Sudbury deposits agree that those ores are of igneous origin; that the nickeliferous magnetic pyrite, or pyrrhotite, and copper pyrite have separated from a molten mass of rock; whereas the deposits at Cobalt occupy narrow and practically vertical fissures or joints. These fissures cut through a series of usually slightly inclined metamorphosed fragmental rocks of Lower Huronian age. Some recently discovered veins, however, appear to be partly or altogether in the Keewatin formation.

The view taken by Professor Miller is that the material in the veins has probably been deposited by heated waters circulating through the fissures of the crust. The metals may have come up from a considerable depth with the water, or may have been leached out of the rocks of the Keewatin. The orebodies are unique among those known on this continent, but resemble some European veins, such as those of Annaberg, in Saxony, and at Joachimsthal, in Austria. Those foreign deposits show an association of minerals similar to that which is characteristic of the Cobalt veins; the generally accepted explanation is that they were leached from the surrounding rocks.

The more important ores comprise native silver (which is usually associated with dyscrasite, argentite, pyrargyrite and other compounds of the metal), smaltite, niccolite and related minerals. Their identification is rendered difficult by their often occurring mixed in the ores and by most of them being in massive form. Crystals, when present, are small, being almost microscopic in size, but Professor Miller has identified certain minerals as follows:

1. *Native Elements.* — Native silver, native bismuth, graphite.

2. *Arsenides.*—Niccolite or arsenide of nickel; chloanthite, or diarsenide of nickel; smaltite, or diarsenide of cobalt.

3. *Arseniates.* — Erythite, or cobalt bloom; annabergite, or nickel bloom.

4. *Sulphides.*—Argentite, or silver sulphide, millerite, or nickel sulphide.

5. *Sulph-Arsenide.*—Mispickel, or sulpharsenide of iron.

6. *Antimonide.* — Dyscrasite, or silver antimonide.

7. *Sulph-Antimonites.* — Pyrargyrite, or dark red silver ore; tetrahedrite, or sulphantimonite of copper.

In addition there occasionally occur a number of secondary or decomposition products, as well as other sulphides; such as copper pyrite, bornite, galena and iron pyrite, especially in the wall rock. Zinc blende is sometimes found. These were probably deposited before the other minerals.

Nearly all the groups of minerals found in the Joachimsthal deposits are present, the most important exception being pitchblende or uraninite (prominent as being the chief source of radium). The Joachimsthal deposits, however, appear never to have been as rich in silver, cobalt, nickel or arsenic as these ores of the Cobalt district.

With one exception, the five or six veins which had been producers during the few months before the preparation of the report, all carried high value in silver, as also do those veins discovered more recently. The outcrop of the non-silver-bearing vein was about 14 in. in width; it was practically solid ore, not unlike mispickel in appearance, and was found to contain two constituents, the ground mass being smaltite interspersed with grains of niccolite. Much of the surface showed cobalt bloom as a decomposition product.

In most of the veins where silver is found in important amounts, a uniformly massive structure (like that of the ore just referred to) is not exhibited, as there is more or less calcite present, and sometimes a little quartz. The ores are frequently grown together, arsenides of cobalt and nickel having native silver intimately mixed with them; while at other times there is almost massive smaltite or niccolite.

The native silver is in masses and also occurs in films, flakes, sheets and wire-like forms, especially in calcite. On analysis it is usually found to contain some antimony, and occasionally bismuth. The dyscrasite is usually closely associated with native silver. Pyrargyrite is not very abundant; argentite occurs in a number of the veins. Native bismuth has been found in all the deposits worked.

The shipments of ore during the three months ending March 31, 1905, amounted to 354 tons, with a total value of $293,552; an average of $829 per ton. The average percentage of metals in the ore was as follows: Silver, 4.802%; cobalt, 8.264%; nickel, 4.739%; arsenic, 34.606 per cent.

In this calculation, the cobalt, nickel and arsenic in one carload of the shipments are not included. The silver represents 1,406.27 oz. per ton. During the second quarter of this year, March 31 to June 30, 1905, the shipments were 537 tons, valued at $394,552, or over $734 per ton; the average percentage of the metals in the ore was as follows: Silver, 4.158%; cobalt, 6.890%; nickel, 3.091%; arsenic, 30.912 per cent.

The metals were sold at approximately the following prices: Silver, 55 to 60c. per oz. Troy, for 90% of the contents; cobalt 65c.; nickel, 12 to 15c., and arsenic, about 1c. per pound.

The report gives a description of the specimens of the cobalt-silver ores (which were secured through the Bureau of Mines and were shown at the Louisiana Purchase exhibition in 1904); they were subsequently purchased by the Dominion Government as a permanent exhibit. The various minerals found in the veins are treated; analyses of some of the more notable specimens are given, and the characteristics of the leading mines are dealt with.

A considerable portion of the work is devoted to the geological formations of the area. Professor Miller notes that most of the silver-cobalt veins occur in the Lower Huronian, though a few have been found in the diabase; he considers that there is no reason why they should not also occur in the underlying Keewatin. In fact, some of the later discovered deposits appear to be in that group. It is noted that none of the veins are wide. The width of ore in the Trethewey vein, one of the most productive, had a maximum width of about 8 in.; while the veins in two other prominent locations have 14 and 18 in., respectively. Some veins which have been traced 100 ft. or more, average not more than an inch in width.

Professor Miller finds it impossible to give much definite information concerning the depths to which these veins will reach.

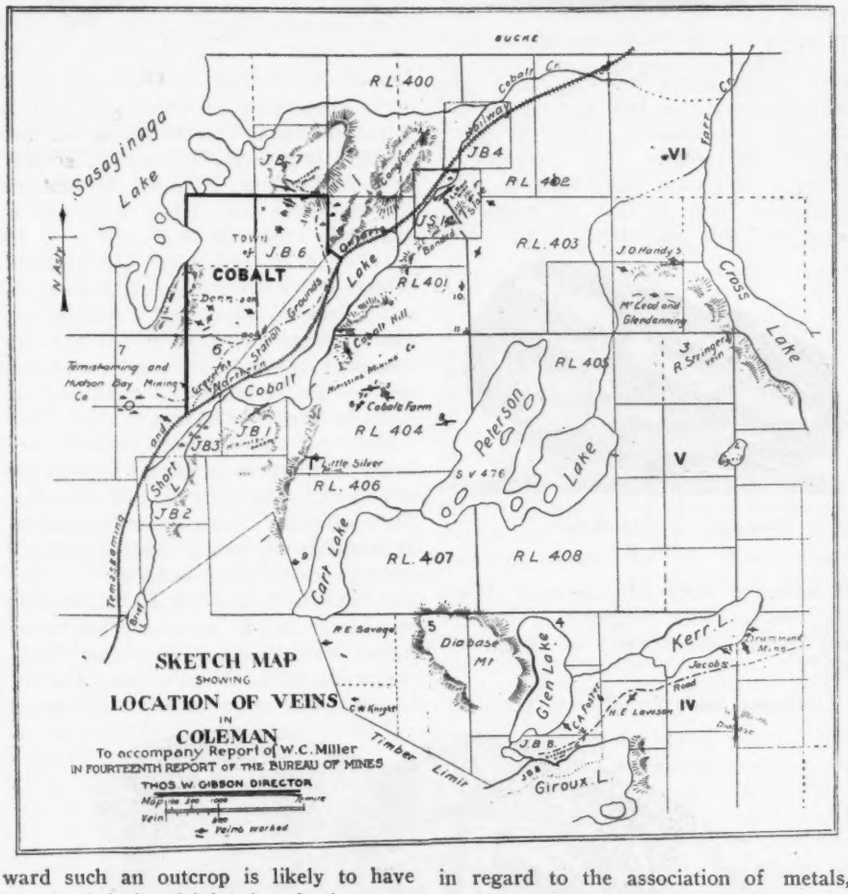
Most of them do not appear to cut through the older Keewatin series which forms an uneven surface below the Lower Huronian. The topography of the region indicates that, while the Lower Huronian may in some places have a thickness of 500 ft., in other localities this series is entirely wanting, outcrops of the Keewatin and of later diabase forming the surface. Consequently, the depth to which a vein may reach depends on whether it descends into an old valley of the older rocks, or lies upon a former hill-top, which cannot be ascertained without diamond-drilling or putting down a shaft. However, as an exposure of the Keewatin surrounded by the Lower Huronian represents an old hill-top, a vein striking toward such an outcrop is likely to have less depth in its vicinity than further away from it. Similarly, if a diabase dike or mass cuts vertically through the Lower Huronian, it indicates greater depth in an adjacent vein than if the Lower Huronian were cut at a lower angle, as in the latter case, the vein might be cut off at no great depth from the surface. Examples of such occurrences can be cited.

Comparing the Cobalt deposits with those of Silver Islet mine, and with the Port Arthur district on the north shore of Lake Superior, the writer points out that, while in richness of silver the latter ores resemble those of Cobalt, yet they contain a much lower percentage of cobalt, nickel and arsenic. However, cobalt bloom and nickel bloom, together with arsenides and other compounds, were found in the Port Arthur deposits with the silver. The chief difference between the two is that the Port Arthur deposits contain a higher percentage of gangue material, the ore usually occurring in branches or pockets and the percentage of silver being always much higher than that of the associated nickel and cobalt, which are entirely absent in some of the deposits. The deposits of the Cobalt area contain a smaller amount of gangue, and the percentage of the other metals is often higher than that of silver.

The latter portion of the volume is devoted to an account of foreign cobalt deposits, more especially those of Joachimsthal and Annaberg, to which reference has been made as presenting characteristics, in regard to the association of metals, similar to the veins of the Cobalt area.

In addition to numerous plans and illustrations, the book contains a large colored map of the cobalt-nickel-arsenic-silver area, on a scale of 1 mile to 1 in.; it shows the geological formations, and gives the principal mines now in operation. This map (which was issued separately by the Bureau some time since in advance of the report) has been greatly in demand by prospectors and others interested in the district, some 4,000 copies having been distributed. Owing to the great interest taken in the Cobalt mining camp, Professor Miller's comprehensive report will meet with deserved appreciation.

A sketch map of this region appeared in this JOURNAL, Sept 9, 1905, p. 447.



Quartz-Glass Apparatus.

Three German chemists, Heraeus, Siebert and Kühn, have succeeded in blowing flasks, beakers, etc., of standard size, from fused quartz. Vessels made of this materi are nearly insoluble in water, acids, and salt solutions (much less so than the best hard glass); they are, however, attacked by alkaline solutions, and at high temperatures are susceptible to oxidation.

The first attempts consisted in heating lumps of quartz to 1,000° C. and plunging them into water, by which process they were reduced to fragments. This material was then fused in the oxyhydrogen flame, yielding a "glass" which, however, was filled with air bubbles. This defect was overcome by fusing natural quartz in iridium or iridium-ruthenium crucibles by oxyhydrogen flame in a lime or magnesia furnace. Quartz assumes vitreous modification at about 1,700° C., or 80° below the melting point of platinum. The bubbles of air, contained in vitreous quartz obtained by this method, are large and may be released by keeping the mass fused for some time; this is not difficult, since pure iridium can be obtained that will sustain a temperature of 2,200° C. for a long time. The blowing of quartz glass is an extremely delicate operation.

L. Guillet, in *Comptes rend.*, 1905, CXL, 1689-1691, reports that he has examined steels of varying carbon content, containing up to 10% of tin, up to 9% of titanium, and up to 60% of cobalt. Each of these metals dissolves in the iron, and the carbon present exists entirely as iron carbide. None of the three metals influences sensibly the mechanical properties of the steel, so that no industrial application of the respective alloys suggests itself. The difference between tin or titanium and silicon, or even between cobalt and nickel, in this respect, is remarkable, the cobalt steels, like those of tin and titanium, failing entirely to manifest the properties so much valued in nickel-steel.

Kohn-Abrest, in *Comptes rend.*, 1905, CXLI, 323-4, states that aluminum powder, heated for 10 minutes in a tube open at both ends, shows no sign of oxidation unless the temperature be above 400° C. The rate of oxidation slowly increases as the temperature is raised to 625° C., and from that temperature to 750° C. is constant. Above 800° C. it increases again to 1,000° C., from which temperature to 1,200° C. there is no change in the rate. The metal begins to lose its luster about 500° C., and gradually becomes grayer and less metallic looking as the temperature rises. When heated for an hour at 1,000° C. the weight of oxygen absorbed is a maximum.

At the Bethlehem (Pa.) plant of the New Jersey Zinc Co. the bags for oxide collection are 24 in. diameter by 30 ft.

Some Queensland Minerals.

B. Dunstan, acting Government geologist, Queensland, has recently published some notes[1] on singular mineral occurrences in Queensland that will be of general interest. Reference may be made to the following:

Association of Iron Ore and Garnet Rock.—Mount Lucy is one of the prominent hills near Almaden, a township on the Chillagoe railroad. The principal formation is a hornblende-biotite granite,

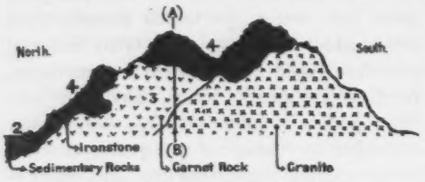


FIG. 1.

containing aplite dikes, quartz stringers and small, irregular quartz masses. Further west of Mount Lucy the granite is covered by shale, calcareous sandstone and altered limestone. To the north and south, the prevailing rock is granite. Fig. 1 shows a longitudinal section of the mountain. On the south end the granite

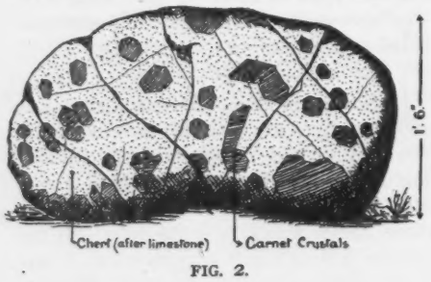


FIG. 2.

is exposed, and above is an ironstone cap. The ironstone on the northern end is seen to dip under a sedimentary formation and to overlie a mass of garnet rock. On the western side of the mountain the granite is capped by chert and quartzite formations. The garnets are chiefly andradite (lime-iron garnet). In many places the garnet-rock has become disjointed and the cracks are filled with silica, while much of the garnet has been changed to magnetite. In this condition the rock has been subjected to exposure and surface leaching. The remaining portions of garnet-rock, while retaining their form where crystallized, have been to a great extent converted into friable magnetite. This latter mineral also occurs in the chert as a pseudomorph after garnet which resulted from the alteration of limestone.

Fig. 2 represents a block of chert and garnet formed at the contact of limestone and granite. The limestone was converted to chert and quartzite before the alteration of the garnet commenced. Magnetite replaced the andradite at a subsequent period.

Wollastonite and Garnet.—These minerals are also associated with the chert, and frequently form conspicuous outcrops. Wollastonite weathers easily and helps to exaggerate the rugged structure of the chert and garnet-rock.

A typical form of wollastonite and

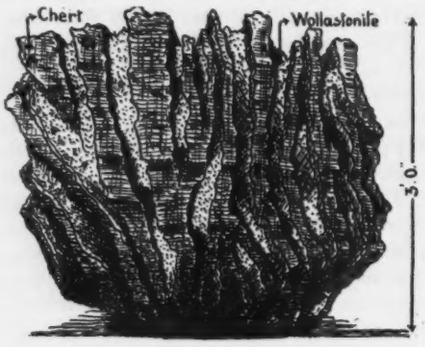


FIG. 3.

chert weathering is shown in Fig. 3. The wollastonite will be seen worn down into crevices and hollows, while the chert stands out abruptly. The ironstone is between magnetite and hematite. Its crystalline form is that of magnetite, while in color and streak it resembles

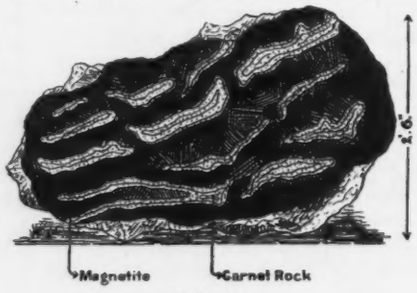


FIG. 4.

hematite. A block of magnetite, showing cleavage with remnants of garnet-rock partly decomposed, is shown in Fig. 4.

Limestone and Garnet.—On parts of the Golden Gate reef, Croydon, Queensland, the quartz has been changed into calcite, in the cavities of which finely developed calcite crystals have formed. In Fig. 6 is shown the general appearance of the calcite crystals as they occur in groups, with the line of pyrite inclusion passing through them. In Fig. 5 the character of the twinning is illustrated as magnified somewhat. The pyrite dust inclusions appear in section on the terminal faces; the miscroscopic crystals of pyrite traversing the calcite crystals (with the median line of the pyrite at right angles with the principal axes of the calcite) are also shown.

Tellurides.—Tellurides of gold, silver and lead are found in a number of places in the workings below the 600-ft. level in the No. 2 South Great Eastern mine, Gympie. Tellurides of gold and silver occur in the form of the mineral hessite. It is a lead-gray colored sectile mineral, having a bright metallic luster, a hardness of 2, and sp. gr. of 8.50. It contains 50.339% silver and 5.049% gold, and is essentially a telluride of silver.

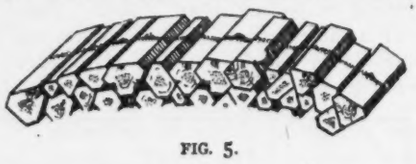


FIG. 5.

Tellurides of lead, silver and gold are present in the mineral altaite, a tin-white sectile mineral, possessing a distinct cubical cleavage and a sp. gr. of 8.10. It contains 0.09% gold and 0.70% silver, as well as lead, sulphur and tellurium. It is chiefly a telluride of lead.

Both the above-named minerals are found in a matrix of quartz and calcite, and together constitute 50% of the mass. Native gold and minute traces of a brownish mineral, resembling siderite, also accompany the tellurium minerals.

Monazite.—Monazite and cerium minerals occur in the wolfram deposits in various localities on the Walsh and Tinaroo mining fields. The monazite is found in pure crystalline masses, sometimes

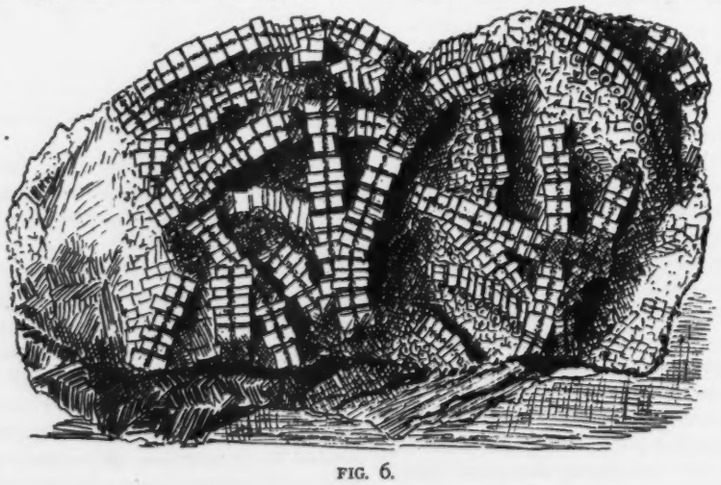


FIG. 6.

several pounds in weight, as well as in small cleavable grains. Both forms are irregularly disseminated in granite. Wolfram, scheelite, molybdenite, cassiterite, fluorspar, topaz, pyrite, mispickel and cerium earths accompany the monazite.

[1] "Records"—No. 2, Geological Survey of Queensland. Brisbane, 1905.

Notes on Water Softening.*

BY W. M. GARDNER AND L. L. LLOYD.†

The advantages in the use of soft water for steam raising and for most manufacturing operations, are now generally recognized. The cost of town water to manufacturers varies between 4d. and 1s. per 1,000 gal., and usually the latter figure is far above the interest on the cost of sinking a well and pumping, even if a subsequent softening process is necessary.

No hard and fast rule can be laid down with regard to the desirability of softening a water. From the point of view of steam raising, this will depend not only on the nature of the water, but upon the type of boiler used, the working pressure, circulation, etc. It should be recognized that the cost of the water before it enters the boiler is in any case small compared with the cost of converting it into steam. Taking as a basis that 1 lb. of coal at 8s. per ton burnt in the furnace of the boiler, will, convert 9 lb. of water into steam, the cost of evaporating 1,000 gal. of water would be 4s., whereas the cost of the water, even including softening, should not exceed 6d. per 1,000 gal. As an average statement, it is safe to say that the use of a water of 20° hardness will cause a loss of 15 to 20% in fuel; that is to say, the decrease in the efficiency of the boiler due to scale formation, more frequent blowing off, increased repairs, etc., will be about 20%. This means an increase in the cost of evaporation of about 1s. per 1,000 gal., whereas the cost of softening (including interest on plant), should not, in an extreme case, exceed 3d. per 1,000 gal. From the point of view of steam raising, the softening of water is thus well worth consideration to all interested in power production of any magnitude.

The use to which the water is to be put should influence the decision as to whether a water can with advantage be softened, and should determine the nature of the softening process recommended.

The actual results obtained by the softening process, depend upon a complex set of conditions, the chief of which are: (1) The degree of hardness of the water; (2) the amount of magnesium salts present; (3) the amount of neutral salts present; (4) the method and apparatus used in carrying out the process.

A good deal of attention has been paid to the influence of magnesium salts in water softening, but the effect of the presence of neutral salts and the influence of the apparatus employed in softening, have hardly received due recognition by chemists.

Effect of Neutral Salts.—Examination of a large number of water samples from all parts of the country, has led us to the conclusion that on an average, six waters in ten may be expected to contain a fairly large quantity of neutral salts, chiefly sodium sulphate. Too little attention is paid to the influence of these bodies, not only in water softening, but in the action of the water in subsequent use, and many irregularities in results may be attributed to this cause. The presence of neutral salts in quantity is indicated by a great difference between the amount of total inorganic solids, and the total hardness, and in such cases we have found that the softening process cannot be pushed so far without undue alkalinity as is possible in the absence of neutral salts.

The removal of calcium permanent hardness by means of sodium carbonate, or magnesium permanent hardness by means of lime and soda, results in an increase in the amount of mineral solids in the water, since 142 parts of sodium sulphate are produced by the removal of 136 parts of calcium sulphate or 120 parts of magnesium sulphate. The softening of a water of 10° permanent hardness, will thus generally result in the presence in the soft water of about 11 grains of sodium sulphate per gallon. This is sufficient to exert a deleterious effect in many processes.

Influence of the Apparatus.—The influence of the method and of the apparatus used, on the degree of softening attainable, is largely concerned with two variables, namely, the time during which the reaction is allowed to proceed before removal of the precipitate, and the temperature at which the process is conducted. By the use of a suitable apparatus it is frequently practicable to utilize waste steam, and thus raise the temperature in the reacting chamber. Another plan is to run the water through a condenser before passing it to the softening plant. Raising the temperature greatly facilitates the reaction.

With regard to the time factor, it is not to be expected that reactions carried out in such dilute solutions as occur in water softening will be completed rapidly; and other things being equal, that apparatus will give the best result which allows of the longest time of contact before the deposit is removed. This largely determines the output of a plant of a given size, and it is not infrequently the case that with a view to economy in installation, an apparatus of too small a size is put up. In order to obtain the necessary amount of water, the apparatus is then worked at such a rate of flow that sufficient time of contact is not given, with the result that an unnecessary amount of further deposit is produced in the storage tank or in the boiler.

Another point having an important influence on complete and rapid reaction is to ensure a sufficient degree of agitation of the water after mixing with the reagent. Experiments also tend to show that the reactions are more complete by working the apparatus under pressure.

In the technical softening of water the treatment is sometimes confined to the removal of temporary hardness by reaction with lime. This case is simple if the water contains calcium salts only, the amount of calcium hydroxide required being equivalent to the calcium bicarbonate, *plus* the free carbon dioxide. The reaction is also quantitative in the case of solutions of magnesium bicarbonate; but in this case a double quantity of calcium hydroxide is necessary, as the magnesium should be precipitated as hydroxide and not as carbonate. If magnesium chloride or sulphate is present, the total magnesium must be taken into account.

Determination of Lime Factor.—In the experiments concerning the action of lime on magnesium waters with water of 39° temporary hardness, due to magnesium bicarbonate, 33.75 grains of lime per gallon was found sufficient to reduce the temporary hardness to 2°. With water of 53.5° temporary hardness, due to calcium bicarbonate, and 10° permanent hardness, due to magnesium sulphate, 42.2 grains of lime per gallon reduced the temporary hardness to 3 and the permanent to *nil.*

Two hundred and ten cubic centimeters of the sample is transferred to a stoppered cylinder, and lime water of a known strength is added in considerable excess. The cylinder is kept stopped and shaken during two hours, the precipitate being then allowed to settle, or being removed by filtration in the case of magnesium waters, which do not readily settle. Seventy cubic centimeters is pipetted off and titrated with N/10 hydrochloric acid, using first phenol phthalein and then methyl orange as indicator. The difference between the two titrations is probably a measure of the calcium and magnesium carbonates still in solution, and this is deducted from the figure obtained in the phenol-phthalein titration. The result then gives the amount of lime in excess, and the figures thus obtained are more accurate than by a simple titration.

Determination of Soda Factor.—In the experiments with lime and soda, 16 grains of lime and 21.2 grains of sodium carbonate per gallon were necessary to reduce a temporary hardness of 10° to 3.75°, and permanent hardness of 20° to 0.75°. With a temporary hardness of only 5.5°, permanent hardness of 14.5°, and magnesia hardness of 3.9°, five grains of lime and 17.5 of sodium carbonate per gallon did not reduce the temporary hardness materially, and the analysis showed 0.25 alkalinity as sodium carbonate.

Seventy cubic centimeters of the sample is placed in a platinum dish, and an excess of N/10 sodium carbonate is added. The solution is evaporated nearly to dryness, and then somewhat diluted, and the precipitate washed with air-free water. The excess of sodium carbonate in the filtrate

*Abstract of a paper in *Journal* Soc. Chem. Ind., Apr. 29, 1905.

†Of the Dept. of Chemistry of the Bradford Technical College.

is then found by titration with N/10 sulphuric acid.

This also gives the permanent hardness of the water in the absence of sodium carbonate in the original water. If this is present, it is determined as follows: 70 c.c of the water is evaporated to dryness in a platinum dish on the water bath. The residue is treated with a small quantity of water free from carbon dioxide, filtered and the filtrate titrated with N/50 sulphuric acid. The amount of acid required to neutralize the alkalinity thus found is reduced to N/10 acid and is then deducted in estimating the permanent hardness.

Reference may finally be made to the use of barium hydroxide as a reagent in water softening. This has recently been placed on the market as a solid product, containing about 60% of barium oxide. Our experiments with this substance have not been exhaustive, but we have come to the conclusion that at its present price it can be used only in special cases. In the baryta experiments, if more than 15 grains per gallon were used, it showed in the final qualitative test for metals. The amount employed must never exceed the equivalent of the temporary hardness due to calcium carbonate or half the temporary hardness due to magnesium carbonate. In the case of magnesium sulphate, the barium hydroxide may be added until the whole is precipitated, as both products, barium sulphate and magnesium hydroxide, are insoluble. Addition of lime is in this case required for removal of temporary hardness. In the presence of sodium sulphate, sodium hydroxide is formed, and baryta cannot be used to diminish the total solids in water so far as they are due to sodium sulphate. The solubility of barium carbonate is variously stated in books as 1 part in 4,000, 12,000, 14,000, 47,000 and 64,000 of cold water. Our experimental results show that it possesses considerable solubility, probably about 1 in 12,000, and as the barium compounds are reputed to be poisonous, barium hydroxide must be used with great caution in the treatment of drinking water. If the amount used is carefully regulated, however, to exclude the possibility of the presence of barium carbonate, not a trace of barium remains in solution.

Sulphating Slime.

Donald Clark (Victoria, Australia,) has introduced a new method of sulphating argento-auriferous precipitates from slime. Lime, zinc, etc., are removed by preliminary and separate washing with dilute hydrochloric and sulphuric acids. The base metals and part of the silver are removed (as sulphates) by digestion with hot pyro-sulphates or nitre cake, and fusion at a low temperature. The cake is leached with water, the silver being finally cleared with hot sulphuric acid; the gold is then extracted from the residues by amalgamating, cyaniding, or fluxing.

Sand for Mortar.

The best sand for mortar is one in which the various sized grains are present in just the amounts to fill each other's voids, rather than one whose grains are all of the same size. The influence of clay and the value of fine sand in mortar has been studied by the engineer of masonry construction of the Chicago, Milwaukee & St. Paul railway, who reports the following results: All test briquettes were made in the proportion of 1 cement to 3 of sand. The standard sand adopted was one of which 54% passed 24 mesh and 11% passed 50 mesh.

A sand, of which 92% passed No. 24 and 28% passed No. 50 seive, consisted of rounded quartz grains and angular shell fragments or soft limestone; this gave briquette about three-quarters of the standard strength adopted by the railroad, and only 7% less than the standard recommended by the American Society of Civil Engineers. Another sand, containing 7.7% of clay, gave tests which were 40 to 30% above the standard, but fell after three years to only 20% above. Another sand, with 6% clay, gave results 25% above the standard; but after washing, the clean sand fell to 30% below standard. A fourth, containing 12% clay (all of it passing 100 mesh and 93.2% passing 200 mesh), gave 7- and 28-day tests of only 35% of the standard; after a year a strength 77% of standard (or about equal to the standard of the American Society of Civil Engineers) was attained.

In general, the results of the tests showed that clay up to 12% is not objectionable, provided it is evenly distributed; also, a sand containing grains of graded sizes is better than one of uniform grains.

Whether the proportion used in the tests (that is, 1 : 3) is correct for the sand tested is not apparent. The results obtained might reasonably be expected, if the percentage of cement used was not that required for the particular sand tested; in this case, too much cement, if mixed very wet, might give higher results with a loamy, clayey sand, than the correct proportion with a sand of a higher grade.

Copper ore is said to have been discevered in a promising lode near Reykjavik, the capital of Iceland.

The Zwoyer Briquette Process.

This briquette is the result of seven years of experiment. While it is adapted to the agglomeration of any fine material (whether coal dust, lignite, coke breeze, iron ore, flue dust or concentrate), yet its principal use is the utilization of finely-broken coal which was formerly treated as waste. In recent years the natural effect of the higher cost of coal production has forced the problem of saving this fine mineral fuel, and manufacturing it into briquettes to compete with the natural product. This dust resulting from breakage is composed of the best part of the coal; since the slate, bone and rock do not, as a rule, pulverize so readily as the coal. This process succeeds in saving this fine dust, as is indicated by the manufacture and sale of over 3,000 tons of anthracite briquettes manufactured in the company's experimental plant in Jersey City.

The process consists essentially of the following details: The dust is fed to a set of 36 by 16 in. mineral rolls, where it is crushed to a determined size; the fineness to which the dust is reduced depends on the nature of the coal itself. From the crusher, the dust is conveyed to a series of heated furnaces; in passing through these it is dried, heated, and mixed with a binder. The coal dust is then conveyed to a press, which makes it into biscuit-shaped briquettes; the present size of anthracite for domestic use is 1¾ by 1¾ by 1⅛ in. The pressure used is 3,000 lb. per sq. in.; for soft coal, lignite, and coke breeze, a pressure of 1,600 lb. is sufficient. The briquettes are then conveyed to a drying oven to be hardened. From the drying oven they are elevated to a cooling table, after which they are ready for use.

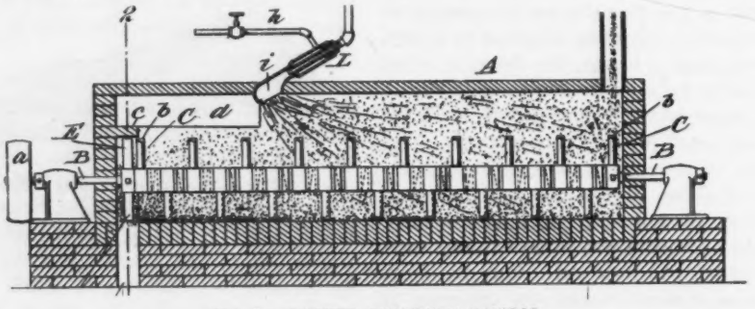


FIG. I. ZWOYER BRIQUETTE PROCESS.

These briquettes will stand transportation and handling with less dust and breakage than the coal from which they are made; they are weather-proof irrespective of the coal dust of which they are made; they can be shoveled the same as other coal. The briquettes burn evenly; are as hard in the fire as when cold; require little draft; have a good calorific value; are odorless; and they burn completely, leaving less carbon in the ash than in that from natural coal. They will hold a fire longer than coal, and produce but little ash.

The briquettes made of iron ore and

flue dust will smelt without disintegrating in the furnace. In briquetting non-combustible materials (such as ore, concentrate, etc.) the amount of carbon and binder added, make up 10% of hard coke in the briquette, which reduces the amount of fuel necessary for smelting. In using this process the amount of binder necessary varies from 4½% in hard and heavy material, to 9½% for coke breeze and light lignite.

The apparatus and method of introducing the binder into the material to be briquetted are shown in Figs. 1 and 2, which depict parts of the mixer and heater. The material is introduced at one end of the mixer, where it falls on a rapidly revolving shaft with blades; these blades have a slight pitch sufficient to transport the material. By means of the rapid revolution of the blades, they pick up the dust and throw it above the mixer shaft; as soon as it falls, another blade kicks it up instantly, so that the material, in a finely divided

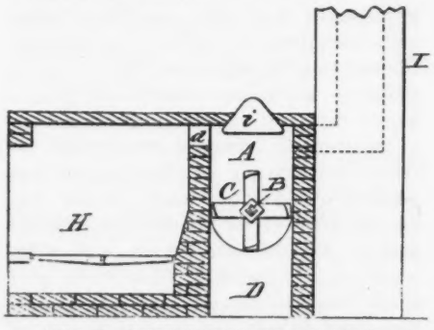


FIG. 2. ZWOYER BRIQUETTE PROCESS.

state, is kept in suspension in the upper part of the mixer. While in this condition, the binder is atomized (by superheated steam) into the other end of the mixer; the binder, when atomized, has the appearance of black fog which passes through the material but in a direction opposite to its general motion; each particle of dust is evenly coated with an almost imperceptible coat of binder, and sufficient to cement it into a briquette, while hot under the press.

A furnace is used to heat the mixer so as not to chill the material passing through it. Repeated tests have shown that about one-half the binder is used as compared with the best processes in Europe on the same material, the briquettes being of equal hardness.

The advantages claimed by the manfacturers are: (1) The low cost of production, including cost of equipment, power, labor, and binder. (2) The whole plant is automatic, requiring three men to operate a plant of 10 to 12 tons per hour. (3) The quality of the product obtained. (4) The adaptability of the process and machinery to any kind of material, and in any locality.

The expense of manufacture by the process in power and labor is less than 25c. per ton; that of the binder being 55c. per ton at New York, depending to a great extent on the specific gravity and the kind of dust briquetted.

The Zwoyer Fuel Company has operated a commercial plant in Jersey City, and it now has a manufacturing plant in Brooklyn (for the New Jersey Briquetting Co.) of 10 to 12 tons per hour capacity, which is now in operation.

The company is under the direction of responsible men; the officers are: George Crocker, president; J. Forbes Potter, treasurer. The offices of the company are at 25 Broad street, New York. The engineer of the company is G. J. Mashek.

The Arch That Turned a Handspring.

BY J. H. GRANBERY.

Metallurgical works often show many features that are novel and of interest to the constructing engineer; and, from this novelty, as well as from the successful

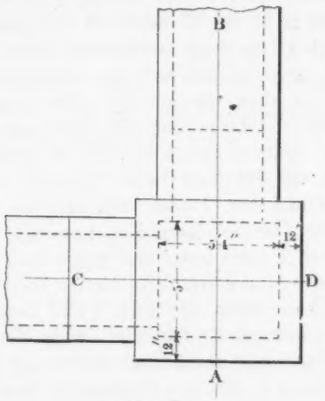


FIG. 1.

solution of difficulties, they deserve a place in technical reviews.

The construction (shown in the accompanying illustrations) was aptly described by one of the bricklayers on the job in the

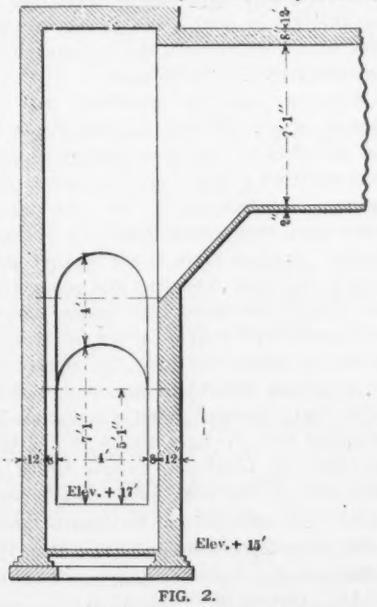


FIG. 2.

words of the title. Fig. 1, 2 and 3 show the conditions required. Of these Fig. 1 is a plan; Fig. 2 and Fig. 3 are sections on *A—B* and *C—D*, respectively. This construction was used in a brick flue connecting furnaces (built on different levels and at right angles to each other) with the opening in the stack base. It was required that the arch be beveled off at 45°; and, in turn, this necessitated some means of building an inclined arch that would not become (by reason of the amount of cutting required) prohibitive in cost.

Fig. 4 shows the method followed in laying up the brick in the inclined part of the arch. The part below the heavy zigzag line, being vertical and laid up in the

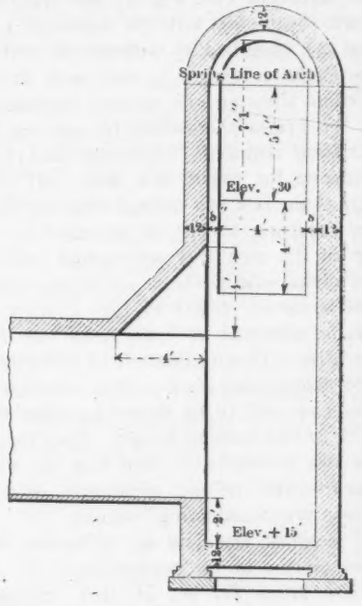


FIG. 3.

ordinary manner, is not shown. The heavy line referred to corresponds to the spring line of the arch; the vertical wall was built up to this line before any of the arch brick were laid up. Before the work reached a point where the men would be ready to go ahead with this part of the

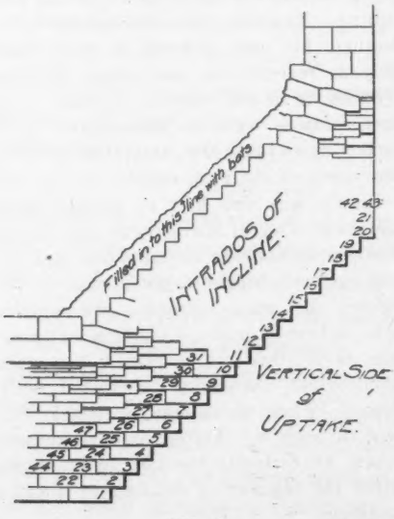


FIG. 4.

flue, the writer tried building a model with soap blocks; these were cut to ¼ by ½ by 1 in. in size, and built up to form a reproduction, in miniature, of the work

as it was to be laid up. Soap, used for this purpose, is sufficiently adhesive to hold together, and, if the bond is kept, makes a model that is quite strong enough for all practical purposes. The use of these blocks really determined the manner in which the brick should be laid up; such cutting as was required being easy to do, and the relative amount necessary for different schemes of laying being apparent as soon as each was tried.

In actual construction, the arch brick were laid up in the sequence in which they are numbered (see Fig. 4), the first three rows (beginning with the numerals 1, 22 and 44) were laid up without any cutting, the slight difference in the curve at this portion allowing the natural unevenness in the bricks themselves to take up the variation required. About one-third of the bricks in the fourth row were cut; from here to the last (or keying) row, the number requiring to be cut increased as the top of the arch was approached. All of the keying row had to be cut on two sides; this is shown clearly in Fig. 4, where it will be seen that all brick in any one row are alike. This facilitated, to a considerable degree, the work of the bricklayers; who had only to be shown how the first brick or two were to be laid. They caught the idea at once when told how the work was to come out and, apparently, enjoyed seeing the "handspring" turned.

The work was laid up in cement and lime mortar in the proportion 1 : 3 : 12; it cost about $17 per M. laid. Straight work on the same job was being erected at the same time and cost $13.25 per M. laid.

Tantalum.

Pure metallic tantalum, so far as we know, is certainly a very hard metal, and, if it were obtainable in quantity, it could partly replace the diamond for boring and cutting. Tantalum has been known for a century, but was isolated in pure form only as recently as 1903, when Moissan reduced it in the electric furnace. His first samples were so impregnated with carbon as to mask the wonderful physical characters of the pure metal.

Bolton was the first to prepare pure tantalum. One of his methods was to fuse the double fluoride of tantalum and potassium with metallic potassium by the electric arc in a vacuum. His simpler plan is first to make a filament of tantalum oxide; this is then placed in a globe from which the air is afterward withdrawn. Then he passes an electric current through it. As the oxide is decomposed, he exhausts the liberated oxygen, while the filament is reduced to metallic tantalum.

In this connection the practicability of the thermite reaction for tantalum has been the subject of experiment, and the properties of tantalum steel (made through the agency of ferro-tantalum from the aluminum reduction) have been tested to a slight extent.

In addition to great hardness, such that a diamond drill makes but little impression on it, tantalum possesses ductility to a marked degree; though these two qualities would seem to be almost incompatible with each other. Evidently there is more to be learned about this metallic novelty.

At all events, tantalum is unaffected by atmospheric ogygen, except at a red heat, and then but slightly; it is insoluble in common acids, does not amalgamate with mercury, and is fusible only at the highest attainable temperatures; these characteristics adapt it preëminently for filaments in incandescent lights.

The British South Africa Company.

It is probable that shareholders in the British South Africa Company have long since given up all hopes of receiving any dividend on their investment. Year after year goes by and still the expenditure is greater than the income. The company fulfills a different function from any other now existing, and it can only be compared with the old East India Company, which governed the Indian dependencies until 1858. The two companies, however, differ widely in their scope and object and in the nature of the countries under their control, for while the East India Company was formed to facilitate trade between England and India, and carried on operations in a rich and thoroughly developed country, the British South Africa Company was formed to exploit an undeveloped and unexplored tract inhabited by races of very inferior civilization. In prehistoric times there must have been a civilized nation in Rhodesia, but alteration of climate may have driven them out, as was the case in Arabia and Egypt; or possibly they were overwhelmed by savage incursions from the northward.

With the natural drawbacks of the country it was obvious that the hopes of the founders of the Chartered Company were centered round a precious metal production. Unfortunately, so far, these hopes have been realized in only a slight degree. In most parts of the country gold mining has been done, and the production has steadily increased from 56,000 ounces in 1899, the first year of active operations, to 267,000 ounces in 1904, and 303,000 in the first nine months of the current year. There has, however, been an absence of bonanzas such as were found in California, Ballarat, Leadville, Cripple Creek or Kalgoorlie. The ores have always been variable and elusive, and the cost of operations must have averaged more than the production.

The report of the company for the year ended March 31 last, shows a total revenue of £453,000 and an expenditure of £590,000. Receipts from taxes levied on trading operations showed a fall, as compared with those of the previous year, a fact which indicates that business has fallen off. On the other hand the receipts from hut-tax—that is, the poll tax on the natives—have increased from £100,000 to £170,000. The estimated expenditure for the current year shows a smaller deficit, but as all previous estimates of expenditure have been wide of the mark, it is obvious that any exact forecasts are impossible.

One of the interesting points in the report is that much more private prospecting and development on small scales is being done nowadays. In the earlier times it was only wealthy companies that were encouraged, or could afford, to undertake the work of finding and exploiting mines.

The future of Rhodesia from the shareholders' point of view is quite uncertain. Under present circumstances it is difficult to see how the income can be increased and the expenditure diminished. Statements are often made that the British government may take over the country and administer it as a crown colony. Should this be done, the capital of the company would be transformed into a public debt. It is not likely that such a transfer of administration could increase the revenue or decrease the expenditure, and it is fairly certain that the resources of the country itself cannot provide for the interest on such debt, which would, therefore, have to be paid by the Imperial Government. As British statesmen do not care to put any more burdens on the taxpayer just now, it is probable that Rhodesia will have to work out its own destiny under the Chartered Company.

Draft fans or blowers that have a large, intricate framework for supporting the vanes, commonly give a lower efficiency than those of more simple design. When one considers the churning effect that such a fan-wheel would have if running in water, it is not difficult to see how some of the power is absorbed. The fact that the churning motion in the air is not visible often keeps this from being taken into account.

The so-called "uviol" lamp is a new form of mercury-vapor lamp which is made by the Schott firm at Jena. Its name comes from the fact that it gives a considerable amount of ultra-violet radiation. It is made of glass, and is therefore much less expensive than the Heraeus quartz lamp lately placed on the market. It is made in the form of a glass tube some 8 in. long, with a piece of carbon fixed at each end, and having a platinum wire sealed in the glass. The tube contains a certain quantity of mercury. These lamps are being manufactured in 110- and 220-volt patterns. With a current of two or four amperes, they are said to give about 800 candle-power.

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THE CONFERENCE of coal operators in Chicago last week seems to have been hardly a success; though arrangements were made to form an association to meet the miners in an organized way. But the operators of the Pittsburg and Hocking Valley districts did not join; and those of West Virginia gave only a doubtful assent. No effective union will be possible without those districts.

THE COMING YEAR will witness the expenditure of an extraordinary amount of money in new equipment for the iron mines of the Mesabi iron range in Minnesota, and also for the opening and equipment of new property. By the close of 1906, it is probable that no other iron mining region in the world will be so thoroughly and expensively equipped for rapid and continuous production as the mines of Minnesota. Steam shovels, locomotives, pumps, and machinery, of a class both heavy and expensive, are included in the orders, which, it is hoped, will be filled during the coming winter.

THE CLOSE interdependence of commerce and industry in modern times is shown by the fact that the trouble in the Caucasus, which amounts practically to a revolt against the Russian Government, has had an immediate result in a large increase in the price of ferro-manganese in Pittsburg. The fact is that the manufacturers of that alloy depend largely upon ore imported from Russia for its manufacture. Anything which interferes with the supply creates trouble in the industry, and it is uncertain when any settlement will be reached in view of the present disturbed condition of Russia.

Timiskaming.

The paper on the Timiskaming minerals, published elsewhere in this JOURNAL, contributes much information regarding the new Canadian region. It is a difficult matter for any new mining district to establish a lasting reputation for large and permanent deposits, even when the veins are numerous and wide; but the uncertainty is much greater when the veins are narrow and capricious. Mr. Thompson's outline of Professor Miller's paper has done much to establish, at least, a modicum of reputation for Cobalt, in the clear description of the mineral species; in the comparison therewith of noted German deposits; in the outlining of some definite geological theory to guide one in estimating the presumable permanence of veins; and in the definite tonnage shipped in the first and second quarters of the current year. Meanwhile exploration of the Timiskaming goes steadily forward.

Alberta Coal.

An important point in the development of the Canadian Northwest has been the discovery of coal on both slopes of the Rocky Mountains. The mines in the Crow's Nest Pass district are already well known and are large producers; while in Alberta, one of the new provinces of the Dominion, new discoveries of coal are continually made, and two or three mines are already well developed and have reached the producing stage. It is well known that a large population is quickly moving into this northwest territory, and the discovery of coal there is of peculiar importance to the settlement of the country. Only a small portion of the region is timbered, so that the people must depend largely upon mineral fuel through the rigorous winter which they have to meet. Besides this it is altogether probable that manufacturing establishments of considerable importance will spring up throughout this Province, as it becomes populated and its agricultural resources are developed. The Alberta coals have been a very fortunate discovery for the Dominion.

The Nomenclature of Zinc Ores.

A resolution introduced by Dr. E. R. Buckley, of Missouri, and adopted by the American Mining Congress, at the recent meeting at El Paso, calls upon the secretaries of State and of the Interior to use their influence "in bringing about a correct usage and interpretation" of the terms calamine, smithsonite, and hydrozinkite, "in accordance with the well-established mineralogical classification found in Dana's text-book of mineralogy."

The purpose of this resolution is to support the contention of the Missouri miners that zinc carbonate ores should not be admitted to the United States as calamine, which acording to the Dingley tariff is free of duty. This is a far fetched attempt to cloud the single clear and specific clause of the Dingley tariff, so far as that act relates to the importa-

tion of zinc ore. There is some doubt as to whether under the law the sulphide ores of zinc should be admitted free of duty, or at the rate of 20 per cent. *ad valorem*. There is no doubt whatever as to the status of the oxidized ores of zinc, which should come in free of duty (as they are coming in at present), inasmuch as the law specifically puts calamine on the free list, and zinc ores of this character are commercially known as calamine and always have been so known. Mineralogically there is some confusion as to the meaning of the word calamine, but commercially there is not any at all. It comprehends both the carbonates and both the silicates; and it is so understood in the trade.

Copper and Spelter.

Copper and spelter have this week attained the highest figures recorded this year, the price for copper having risen to 17¾ cents, while the price for spelter has been 6.35 cents. It is necessary to go back many years to find corresponding figures. In August, 1899, the price for Lake copper averaged 18.5 cents, and in May of the same year prime Western spelter averaged 6.88 cents. Since 1899 the price for either metal has not been so high as at present.

The recent rise in the value of copper has been the natural sequence of the conditions which have existed since early summer. Several months ago the principal producers sold most of their output a long way ahead. Correspondingly the principal consumers provided for their future requirements, and for a long while the market was dull and nominal, but strong. Consumers were bound, however, to re-enter the market sooner or later, and with no remarkable increase in the production of the metal and an increased demand for it there has been naturally a scramble to secure supplies.

Very much the same situation exists intrinsically in spelter, but the American market for spelter is ordinarily only national, while that for copper is always international. The great rise in the value of spelter in Europe, which has been experienced this year, elevating the price to the point at which exports from Kansas could be made at a profit, and the beginning of sales for export two months ago have given a powerful stimulus to the domestic market. Further sales for export have been reported this week, but the sharp rise from 6 to 6.20 cents, St. Louis, appears to have been largely due to a strong speculative movement.

The Eight-Hour Law in Missouri.

The law passed in 1901 by the Legislature of Missouri making it unlawful to employ miners underground for longer than eight hours out of the twenty-four, which has been contested by Mr. H. J. Cantwell through all the courts up to the United States Supreme Court has finally been decided by the last to be constitutional, and steps are now being taken to put it into full effect. If this be done seriously and honestly, much trouble will be experienced in the mining industry of the State, especially in the Joplin district.

The law was enacted at the behest of the labor unions, and in so far as metal mining is concerned, was aimed at the large companies operating in the southeastern part of the State. The Joplin district, in the southwestern part of the State, was disregarded. The mining camps of that district are not unionized, the customary working time is nine hours, the miners work hard during that time and with high efficiency. The mines, as a rule, can be operated by men of small means, and the efforts of the individual miner are stimulated by the idea that he will himself, sooner or later, become an operator on his own account. He has no desire to have his working time reduced from nine hours to eight hours, with corresponding reduction in pay; the mines could not under ordinary conditions stand a charge of nine hours' pay for eight hours' work, even if the operators were disposed to grant it.

However, a State law cannot be rightfully caused to apply in one section of the State and not in another, and if the eight-hour day is to be put in full legal force at Bonne Terre and Flat River, it must be similarly enforced at Joplin, Webb City and Carterville. There is no doubt that such an enforcement will have a serious effect on the production of the Joplin district, and the generally satisfactory conditions which have existed there for many years. Joplin has in mining presented the best example on record of the advantage to labor of increasing its own efficiency, and it is a pity to have its excellent conditions disturbed by short-sighted legislation. The best way to secure the repeal of a bad law is to enforce it. We anticipate that at the next session of the Missouri legislature there will be a strong movement toward that result from the Joplin corner of the State.

Iron and Steel Production of the World.

In the two tables herewith we give the pig-iron and steel production of the world, the figures being for the most part official; though it has been necessary to make estimates for a few countries. The output of Russia is, for the first time, brought up to date by official figures. The figures have all been reduced to metric tons, for purposes of comparison.

Both pig iron and steel showed decreases in 1904, as compared with 1903; that in pig iron being 2.2%, while that in steel was only 0.4%. The ratio of steel to pig-iron production increased slightly, from 0.77 in 1903 to 0.79 last year. The decrease, both in iron and steel output, last year was in great part due to the smaller make in the United States.

STEEL PRODUCTION OF THE WORLD—METRIC TONS.

	1903.	1904.	Changes.
United States	14,756,691	13,746,051	D. 1,010,640
Germany	8,801,515	8,930,291	I. 128,776
United Kingdom	5,114,647	5,107,309	D. 7,338
Total leading countries	28,672,853	27,783,651	D. 889,202
Austria-Hungary	1,146,000	1,195,000	I. 49,000
Belgium	981,740	1,069,880	I. 88,140
Canada	181,514	151,165	D. 30,349
France	1,854,620	2,080,354	I. 225,734
Italy	116,000	113,800	D. 2,200
Russia	2,410,938	2,811,948	I. 401,010
Spain	199,642	196,000	D. 3,642
Sweden	317,107	333,522	I. 16,415
All others	418,000	415,000	D. 3,000
Total	36,298,414	36,150,320	D. 148,094

PIG-IRON PRODUCTION OF THE WORLD—METRIC TONS.

	1903.	1904.	Changes.
United States	18,297,400	16,760,986	D. 1,536,414
Germany	10,085,634	10,103,941	I. 18,307
United Kingdom	8,952,183	8,699,661	D. 252,522
Total leading countries	37,335,217	35,564,588	D. 1,770,629
Austria-Hungary	1,355,000	1,369,500	I. 14,500
Belgium	1,299,211	1,307,399	I. 8,188
Canada	269,665	274,777	I. 5,112
France	2,827,668	2,999,787	I. 172,119
Italy	28,250	27,600	D. 650
Russia	2,486,610	2,978,325	I. 491,715
Spain	380,284	375,250	D. 5,034
Sweden	506,825	528,525	I. 21,700
All others	625,000	633,000	I. 8,000
Total	47,113,730	46,058,751	D. 1,054,979

There is little change in relative rank in the two years. The three chief producers—the United States, Germany and Great Britain—furnished 77.2% of the world's pig iron, and 76.9% of the steel last year. The United States alone made 36.4% of the pig iron, and 38.3% of the total steel.

Beyond this, little comment is necessary, as the tables show the facts clearly. The only marked point is the steady increase in the tendency to convert the pig iron

produced into steel, from which are now made by far the larger part of the finished forms in which iron finds its final market and use.

The latter part of the year 1904 was marked by some depression in the iron and steel trades, especially in this country; and to this the smaller output was due. This depression soon passed, and there is no doubt that production in 1905 will be much greater than in 1903—that is, much greater than in any year in the world's history.

Pyrite Smelting.

Mr. Robert C. Sticht took, as the subject of his address in entering upon the presidency of the Australasian Institute of Mining Engineers, an outline of the history of pyritic smelting—a natural subject, in view of his own prominent part in the recent development of the art and his eminence in its present practice. The expressions of his views to be found therein are of especial interest, inasmuch as he has not been a participant in the general discussions of the subject. He contributed an essay which appeared in the seventh edition of Dr. Peters' "Modern Copper Smelting," but has not since then been a contributor to the literature until the present time. We are hopeful that he will in the near future give some of his extensive experience in the practice of the art. In the meanwhile, the profession will be highly grateful to him for this scholarly essay upon its history.

Not infrequently some operation, at first innocently taken for a novel procedure, has later been found to have had an irrefutable precedent in the more or less remote past. "When confronted by a question of this kind," says Mr. Sticht, "the metallurgist can generally much simplify his search if he at once turns his scrutinizing gaze toward that ancient home of metallurgy—Germany." In the present instance he turned in that direction, and not without some result, although the recorded data are meager, as would have been expected. However, it is found that the introduction of Rohschmelzen, *i. e.*, pyritic smelting, took place in 1555, and the man to whom belongs the credit of originating the idea was Barthold Köhler, Hüttenreuter of the smelting works at Freiberg, in Saxony. Thus there is another verification of the old saying that "there is nothing new under the sun." Mr. Sticht traces, in a highly interesting manner, the gradual development of the idea from Köhler down to the present time. It is to be remarked, however, that the historical development is concerned chiefly with that branch of the general method of matte smelting, which, until about 1891, has been called "pyritic smelting." What we now call "pyrite smelting" is a recent offshoot.

Mr. Sticht makes the following distinction between pyritic and pyrite smelting: Pyritic smelting is the process of smelting dry gold or silver ores, which do not contain sufficient lead or copper for those metals to act conveniently as collectors of the precious metals; the operation is conducted in a blast-furnace, with an amount of carbonaceous fuel sufficing to produce an exclusively reducing atmosphere, and with addition of pyrite, in order to form a regulus in which the precious metals shall be concentrated, the pyrite itself being either argentiferous, auriferous, cupriferous, any combination of these three, or wholly barren of metal values. In the common acceptation of the term, the use of the reverberatory furnace is excluded. By pyrite smelting, on the other hand, is understood the application of blast-furnace smelting to sulphide ores with the definite object of limiting to a minimum, or (if possible) wholly excluding, the use of carbonaceous fuel within the furnace, and of maintaining a chiefly oxidizing atmosphere in the latter, for the special purpose of utilizing the thermal powers of the constituents of the sulphides as the principal sources of heat for the fusion of the solid products. These explanations are not put forward, however, as absolutely final and logically infallible definitions. Mr. Sticht further distinguishes the process of "partial pyrite smelting," which is the one most commonly practiced at the present time.

Pyritic smelting is fairly ancient. Pyrite smelting is a distinctly novel and modern achievement. Pyrite smelting is indeed a near cousin to pyritic smelting, but it came into the metallurgical lineage only after a related, but not intimately associated, side branch (bessemerizing) had established itself. Both are blast-furnace processes, using pyrite as a collector. But, while pyritic smelting demands carbonaceous fuel in order to flourish, true pyrite smelting suffers with its use. In this respect the gulf between them is distinct; but fortunately for the treatment of numerous ores, it is bridged over by an extremely important intermedium, that of "partial pyrite smelting." This has a future which is even greater than that of either pyritic or pyrite smelting. Pyritic and partial pyrite smelting are alike in their requirement of carbonaceous fuel in due proportion, but there is a pronounced difference between them with regard to that proportion. Partial pyrite smelting alienates itself from the pyritic process in leaning toward the pyrite practice in a deliberate, though not complete, renunciation of carbon, and in the support of a more or less oxidizing atmosphere within the furnace, and not of a reducing one.

The historical development has broadly been, first, pyritic smelting; then pyrite smelting; and lastly, partial pyrite smelting. But the interval of time intervening between the second and third is extremely short, compared with the long step from the beginning of pyritic to pyrite smelting. The pure pyrite method will never be applicable to many of the more important mining districts, for, as a rule, heavy pyrite ores are scarce. Its place has been properly taken, however, by partial pyrite smelting; it is in that process that Mr. Sticht foresees the greatest usefulness in the future. He concluded his address with a reference to the discussion of the subject, which was recently originated by this JOURNAL, the contributions having been subsequently collected in book form. "Nothing," says Mr. Sticht, "reveals better than this series of letters the very unequal progress made at different places, and also the following facts, viz., the geographically restricted applicability of the method in its purest form; the progress that can yet be made even in that form; and the unlimited and manifold pliability of the methods of partial pyrite and of pyritic smelting, outside of the narrower region in which the pure form is chief."

Mr. Sticht's recent essay is a masterly contribution to the literature of the subject, and is of absorbing interest. It will stimulate a desire for his own discussion of the technical details of this new, yet old, art which has been of such extraordinary influence in the exploitation of the world's resources of low-grade copper ore; in its modern development the process is only at the beginning of its usefulness, and has possibilities that we do not venture to forecast.

Metallics.

An oil refinery has been built at Saint-Aime, in the department of Oran, Algeria. It is to treat the output of two neighboring wells having a daily yield of 80 to 100 barrels.

One of the largest uses of aluminum is in the manufacture of steel castings. The addition of aluminum to steel promotes a solidity which cannot be obtained in any other manner.

It is stated that helium has recently resisted liquefaction at a temperature estimated at minus 271° C., or only 2° above absolute zero. If this is correct, helium is the only known substance which has not yet been liquefied.

To the simple alloys of copper and tin which are free from zinc, a considerable amount of phosphorus may be added without causing any harm; but when zinc is present, great care must be taken in the amount that is added.

It is reported that the German Admiralty uses a coating of oxide of iron for the prevention of corrosion of copper and brass piping. Herr Uthemann (Admiralty engineer) has made experiments with this material for more than two years.

In the copper rolling mill it is customary to coat the sheets of copper with an emulsion of guano before they are annealed. This causes the oxide to leave the surface when it is plunged into water, and, accordingly, a clean surface is produced.

An excellent cement for leather belting is composed of 2 parts pitch, 4 parts (by weight) of India rubber, 1 part shellac, 2 parts linseed oil and 16 parts gutta percha. The several ingredients are cut into small pieces and afterward melted and mixed over a slow fire. The cement should be used while hot.

The quantity and cost of ore and flux required to make a ton of iron are determined by circumstances over which the furnaceman, under given conditions as to quality and quantity of product, has little control; the principal item of cost, apart from the saving of labor, which he can aspire to reduce, is that of fuel.

During melting, aluminum oxidizes more than any other metal, and a large amount of dross is formed. So much dross forms that it was at first thought necessary to melt the metal under a flux, but experience has shown a flux to be unnecessary. It is best to allow the dross to form, and then recover the metal from the skimmings.

A gas high in B. t. u. is not always a good gas for engines, especially if we have to sacrifice high compression in order to guard against preignition. In the case of the present producers, high B. t. u. generally means a high percentage of hydrogen; and this increase in heating value proves to be rather a detriment than otherwise to the engine performance.

Electrolytic nickel is produced in much the same manner that electrolytic copper is made. The nickel is deposited upon a sheet of the same metal which has previously been coated with graphite to prevent the adhesion of the deposit to the surface. When the requisite thickness has been obtained, the deposit is removed from the cathode plate and is ready for use.

Large quantities of platinum are now consumed in the settings of diamonds. The gold underneath the diamond is covered with a film of platinum, which acts as a reflector and never tarnishes. It enhances the beauty of the setting and gives the stone an appearance of whiteness that is sought by the jeweller, on account of the higher price paid for pure white stones.

Nitroglycerin compounds explode when confined, at 360° F. This is true of all dynamite explosives; but the same material can usually be ignited and burned without explosion provided that it is pure and unconfined. Large quantities have been consumed without any explosion whatever when loosely stored. But its behavior is erratic, especially if the dynamite is old.

Bronze that is to be colored brown is first washed in a solution of 1 part of crystallized verdigris and 2 parts of sal ammoniac in 260 parts of water; it is then dried before an open fire till the green color begins to disappear. The operation is then repeated 10 to 20 times in a solution of 1 part of verdigris crystals and 2 parts of sal ammoniac in 600 parts of water. The color of the article will gradually turn to a brown, which remains unchanged by the action of the weather.

It is said to be the intention to put, in the center of the Indiana coalfields, a large power plant for the generation of electricity, which is to furnish all the power needed for the traction lines of the central and southern parts of the State. Those interested in the project claim that the power can be generated and transmitted to the sub-stations by electric lines more cheaply than the coal can be carted to the present stations and burned in separate plants. The first installation is expected to be in the neighborhood of 10,000 h.p., and the estimated cost is about $1,000,000.

The British consul at Tainan reports that pumps of a large capacity for low lifts, say under 30 ft., but chiefly 10 ft., and requiring low power, will, in the near future, find a market for irrigation purposes in Formosa. They should, however, be simple in construction and easily handled. The extensive cultivation of rice, and the great increase in the planting of Lahanna sugar cane (rose bamboo, a Hawaiian cane introduced by the Formosan Government some years ago), both of which require abundant supplies of water, will probably increase the demand for irrigation pumps.

There is a good demand in South Africa for cement. The largest firms in Johannesburg contract for quantities of from 10,000 to 30,000 bbl., which are delivered as required, or at the rate of so many a month. The Johannesburg municipality is employing German cement for electric tramway lines. German cement is also being used very largely in the construction of many new buildings. German cement has the preference, owing to its lower price, and also to the fact that it arrives by steamers at Delagoa Bay, *via* the Suez canal. Cement shipped by sailing vessels is often damaged on the way. English cement sells better at East London and Cape Town than at Johannesburg. But little American cement has been used up to the present time.

The truss that is one-sided, that is, one whose members are not symmetrically disposed about the center-line of its length, has its uses, especially at the end panels of buildings. No truss carrying main panels, however, should be made one-sided. The members, where angles are used for this purpose, ought to be double, so that the strain lines may all lie in the same plane. Experience with trusses built with some double and with other members of single angles, shows that the warping due to this method of construction is apt to put tension members in compression; this, with other uncertainties, proves a constant source of trouble, and an eyesore to one accustomed to good workmanship. Of course, if an uncertain and unworkmanlike job is *wanted*, this method is as certain to give it as any other.

"Use two rivets!" This advice, marked in red upon old blueprints for steel structural work, brings to mind the practice—far too prevalent among some contractors for this class of work—of using, for minor connections that do not carry much load, single rivets. The fact that a connection of this sort is apt to be bent or knocked out of position in shipping, and then pounded back into the position it should occupy, together with the correspondingly loose and shaky condition of the joint, is apt to be lost sight of. A good rule (and one usually followed by first-class shops) is to use *no* connections that have less than two rivets, or bolts, if bolts are used. The shop that does not follow this rule voluntarily should be required to do so by the terms of the specification; certainly, no engineer ought to approve such slip-shod work.

Colliery Notes.

Anthracite was first successfully used in this country in blast-furnace practice in 1839, at the Pioneer blast furnace, in Pottsville, Pa.

The mine tramway was first used as such in the year 1827, when the first rails were laid in the Port Carbon district in the Schuylkill coal fields.

The first coal breaker in America was erected by Gideon Bast at Minersville, Pa., on Wolf creek. It was driven by a 12 horse-power engine, and had a capacity of 200 tons per day.

The purpose of washing coal is to separate the coal from its dust and impurities, such as sulphur, slate, spar, clay, etc. Washing is also employed for the purpose of sizing the coal in preparing the same for market.

There have been numerous instances of dust explosions in mines where no gas has been discovered. The explosion that occurred at Cedar Mines, Iowa, in February, 1893, is an example of a dust explosion originated by a blown-out shot where there was no gas present. Gas was not detected in this mine, either before or after the explosion.

Coal dust is always an element of danger in any mine. The degree of danger will depend on the fineness and inflammability of the dust and the softness and friability of the coal. All accumulations of dust should be regularly taken out from the working places. All roads should be cleaned regularly and the mine cars made as dust proof as practicable.

Hydrogen sulphide, or sulphureted hydrogen, H_2S, is often produced in small quantities in mine workings where sulphur is present in the coal or refuse of the mine, especially in the presence of moisture. The disintegration of pyrite produces the gas. Its presence is made known by its smell, which resembles that of rotten eggs. It is a very poisonous gas, 1% in the mine air being fatal.

"Black damp," or carbon dioxide, in coal mines tends to accumulate at the floor or in the dip workings of the seam. Hence, whenever practicable, in an inclined seam generating black damp or carbon dioxide, CO_2, the air should be taken in at the highest point, and, after circulating through the mine should be discharged at the lowest point. In mining practice this is not always practicable, however.

Most mine accidents are due to falls of roof and coal, for which the miner is usually to blame, owing to his neglect to set the proper timbers in his working place at the proper time. This class of accidents may be largely reduced by maintaining a proper supply of timbers in each working place, and by seeing that each miner is prompt in setting these timbers, and that he understands how and where to place them.

Carbon dioxide gas, or black damp, CO_2, being heavier than air, tends to accumulate at the floor and in the lower mine workings. Its presence is manifested by the dim burning of the lamps, and by their complete extinction when the gas is present in considerable quantity. Carbon dioxide produces suffocation by excluding the oxygen of the air from the lungs. The presence of 10% of this gas in the mine air is dangerous, and 14% is fatal when breathed for a short time. It is removed by an ample ventilating current.

The excessive use of powder is demonstrating the danger incident to such use. The compositions of some of the cheaper powders of today are inferior; they absorb moisture and lose their strength, and a larger quantity has to be used than would otherwise be necessary. When shots are loaded with these powders a considerable amount of the explosive is blown out, burning, or partly burned. This is also apt to happen if the holes are of too great diameter, even when the better grades of powder are used; in this case it is due to the higher pressure brought to bear upon the tamping, or to the fact that the tamping has not, over the larger area, sufficient strength to resist blowing out.

Marsh gas or methane, CH_4, being lighter than air, tends to accumulate at the roof and in the upper workings of a mine. Its presence is detected by observing the flame in a Davy safety lamp. The gas acts to slightly lengthen the flame of the lamp; when the gas is present in larger quantity, a flame cap is produced that can be seen when there is about 3% of gas present. To observe the flame cap, the flame is first drawn down, making it as small as possible; an experienced fire boss may detect the presence of gas as low as 2.5%. The danger of marsh gas exists in the explosive atmosphere produced when this gas is mixed with the mine air, and especially when dust is present in the air.

In the Newcastle-on-Tyne collieries in England, cages with multiple decks or platforms are in quite general use. In some cases cages are used with five decks, thus increasing the amount of material that may be raised at one time. As the shafts in which some of these cages work are of considerable depth, the time used in hoisting is correspondingly long; and an increase in hoisting capacity is best obtained by some means of increasing the load which is carried, rather than by higher speeds. The latter method is limited to a point beyond which it is dangerous to go, and the multiple deck cage seems to be generally accepted as the most satisfactory method of accomplishing the desired result.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Graduates of Mining Schools.

Sir—I have read with interest Professor Christy's communication, with this title, that appeared in this JOURNAL on Oct. 14. Vain would it be for anyone to question the accuracy of the aphorism so aptly quoted by Professor Christy: "For many are called, but few are chosen," especially when applied to the successful practice of mining engineering. If the intense signification of the aphorism, considered in this relation, were properly appreciated by students planning for graduating from mining schools, it would save a large amount of wasted human energy, and much mental anguish to many graduate-engineers; and it would quickly dispel any questions as to the excess of mining schools and the consequent over-supply of graduate-engineers.

The province of the modern mining school is to train students to methods of scientific observation and investigation, and to familiarity with scientific terms and instruments. It does not intentionally propose to turn out fully equipped mining engineers, any more than a naval academy undertakes to turn out efficient steamship captains, for such is manifestly impossible.

The prime qualification for a successful engineer is administrative ability combined with ripe business acumen. Purely theoretical knowledge is of secondary importance. The experience can be acquired only by years of practical work. No school lectures can supply this. Indeed, a serious objection to mining schools, as organized at present, is that of requiring students to attend four, or more, years before diplomas are awarded; positive injury is done by keeping the students in a scholastic atmosphere, far removed from the industrial world at the very period their characters are most rapidly forming, and when their minds are most susceptible to the acquirement of business and wordly knowledge.

The usual practice of mining schools is to admit any student offering to take its courses; and, as Professor Christy forcibly intimates, to trust to the remorseless but unerring processes of natural selection to weed out all who are not fortunately endowed with those extraordinary "native powers of mind, body and character," required by the successful engineer. Only a small number of mining-school graduates possess the natural powers of mind and character so essential for carrying out the

multifarious and responsible functions of successful captains of mining enterprise. The realization of this, unfortunately, comes late to the mining school graduate; when he goes out into the world to seek a position, he positively learns that he must meet, not only the competition of the hundreds of graduates from other schools, but also the usually more effective competition of the thousands of self-read men who have steadily graduated from the bottom of the ladder in the mine.

The statements made by Professor Christy (and reiterated by President McNair, of the Michigan School of Mines, this JOURNAL Sept. 2) to the effect that supply and demand with regard to mining-school graduates are related to mining activity and proportional to the mineral yield, are worthy of note; but they are obviously fallacious. In periods of general commercial prosperity, when mining is brisk, more parents can afford to send their sons to expensive technical schools; consequently, while tabulated attendance-records of the schools might possibly indicate some interdependence, they would be absolutely misleading criteria of the demand for the services of professional men; but a table, or diagram, exhibiting the small proportion of mining-school graduates who really succeed in obtaining and holding technical appointments in mines within a period of, say, three years after graduating would be instructive.

Instead of limiting the number of mining schools, a more pressing need is the curtailment of the courses to not more than two years, so that students could have opportunities of gaining the indispensable administrative, business and worldly knowledge at that period when their minds are most susceptible to such acquirement.

Another valuable reform would be to require all students desirous of holding high positions in mining and metallurgy to present certificates showing they have had a couple of years' practical experience in mining works before they are permitted to enter a school with the object of securing a diploma. It is significant that none of the Australian State governments, which require the managers of metal mines, as well as of collieries, to be competent, will recognize a mining school or university diploma held by candidates for the compulsory Government certificates. The regulations of the Government of Victoria, enacted this year, require that a man desirous of becoming a (metalliferous) mine manager must not be less than 25 years of age; and before sitting for the examinations he must produce evidence, satisfactory to the Board of Examiners, that he has had five years' practical experience in a mine. This is in recognition of the well-proved principle that practice should be acquired before theory.

A. SELWYN-BROWN.

New York, Nov. 25, 1905.

Fluorine in Blast-Furnace Slag.

Sir—I note, in L. S. Austin's article, "Fluorine in Blast-Furnace Slags," which appeared in this JOURNAL, (Nov. 11, 1905, page 865) an error which might lead to unfortunate results. Regarding the determination of calcium fluoride in an ore, the following statement is made:

"In actual operation the plan has been to consider the CaO which will dissolve on digesting the ore with acetic acid, as being in combination with fluorine; and by keeping a record of all such lime in the charge, it is possible to estimate the amount of it so combined in the slag."

Regarding this statement, I will say that lime combined as fluorspar is not soluble in acetic acid; it is the lime which is insoluble in acetic acid, which is considered as fluoride of lime; the lime soluble in that acid being the "available lime," or presumably all the other lime except that combined as a fluoride.

Again Mr. Austin writes that lime in the shape of fluorspar requires CaO "to satisfy its needs." From actual experience, I am able to state that, aside from imparting an increased fluidity to the slag, the fluoride of lime therein (when its presence is known and allowed for) is inert, and does not change its nature upon melting in the furnace.

It has been asserted that the increased fusibility of the charge resulting from the presence of fluorspar (where lead smelting is being practiced), causes an imperfect reduction, as the ore melts too quickly to give time for proper reduction to take place. Regarding this statement, although it seems plausible, yet I was unable to notice the difference in the reduction, whether we made slags with 1% of fluorine, or whether the amount present was 3%, if the same amount of coke was used in the charge. As I have had no experience with slags containing more than 3% of fluorine, I cannot say what would be the result were this percentage greatly increased.

Another point in regard to the acetic acid determination of "available lime"; this method is not to be trusted where a great variety of ores are being received, as there are other lime combinations besides fluorspar which will not decompose upon being digested with acetic acid. In regard to this, I use a method for the determination of fluoride of lime, in an ore or slag, which is technically accurate; it also has the advantage of being simple and does not require much manipulation. I have frequently run through four or five of these determinations in a day, along with my regular laboratory work. I will take pleasure in publishing this method should any of your readers desire it.

Again, I believe that the trouble to the metallurgist (where there is fluoride of lime to be contended with, the presence of which is not suspected) is that in slag analysis run in the ordinary way, the total amount of lime present is reported; a portion of this lime being inert or unavailable, leads the metallurgist to believe that there is more basic material in the slag than is actually the case. I believe there is a more serious result from the presence of small amounts of fluorine in the slag, than the slight error in determining the silica due to its evaporation as tetrafluoride of silicon.

E. KNEELAND.

Torreon, Coahuila, Mexico, Nov. 18, 1905.

Gold in Labrador.

Sir—In your issue of Nov. 11, under heading, "Gold in Labrador," you have stated that a visit of L. S. Quackenbush and myself to the Labrador inland had connection with a gold discovery. The report perhaps originated with a St. Johns paper, which published something of the sort early in September. Mrs. Leonidas Hubbard is also credited with the same sort of an errand, and I think Dillon Wallace was also. As a matter of fact, none of the visitors mentioned had any idea that there was gold in the country, nor in the case of our own party was any prospecting done whatever; we had no tools for that matter. Mrs. Hubbard has already explained in print that her errand was wholly geographical. Whatever Wallace may have done while inland, he expressed no interest in the subject of minerals in speaking of his plans beforehand.

It is perhaps worth while to correct the report of our having found gold, as being published with the weight of your authority the tale might be misleading to the extent of making some mischief. It would be hard to find a more hopeless immensity of barren granitic rock anywhere on earth than that bordering the peninsula wherever the writer has seen it, and extending westward from the Atlantic into the George river basin. Our trip of the summer was attended by the satisfaction of making what is probably the first crossing by a white party of the watershed between the interior basin and the Atlantic.

W. B. CABOT.

Boston, Nov. 22, 1905.

Steel articles to be silvered are dipped in a mixture of nitrates of silver and mercury, each one being dissolved separately in the proportion of 5 parts to 300 parts of water. They are wiped to remove the black film of carbon, and are silvered till a sample dipped in a solution of blue vitriol ceases to turn red. Iron articles are also dipped in a mixture of nitrates of silver and mercury, prepared as above, before being silvered. The quicksilver is then removed by heating to 300° C. The articles may also be first tinned to economize the silver.

The American Mining Congress.

SPECIAL CORRESPONDENCE.

The subject which occupied the most time at the eighth annual session of the American Mining Congress was the discussion of the establishment of a department of mines and mining in the President's cabinet. This was the keynote of all the addresses and of all the official reports, and the convention endorsed the project. The discussion was in substance to the effect that the mining interests of the country deserved and demanded as much encouragement and protection as the agricultural, and the opinion was generally expressed that to get the best results the Government should give mining the same recognition at least that it gives to farming and other enterprises, not only for the benefit of the miner, but for the uniform development of the whole country.

A step in the direction of making the association purely a miners' organization was taken when the Congress endorsed the proposition for forming State associations in every mining State in the Union, the idea being to have delegates elected to the Congress from these associations and to dispense with the present plan of having delegates appointed by the various governors, mayors and business organizations throughout the country, in which case many of the men named are not miners at all. The Congress did not do away with this plan altogether, but it is expected that it will be abolished at the next session at Denver, and that in the future the Congress will be made up only of delegates named by the mining associations of the various States, duly elected by the delegates and not appointed in the manner observed in the past.

Few technical papers were read at the meeting. It was strictly a business meeting of mining men, discussing the needs of the miner. They put in most of the time discussing the questions of paramount interest to the miner, and the spare moments were taken up with technical papers.

The formation of drainage districts in the various States was one of the important features discussed and favored by the congress. The United States was asked to pass a law enabling miners in certain districts to form themselves into associations for the purpose of issuing bonds for draining their property, something after the plan of the reclamation service in which landowners are permitted to form irrigation districts, bond their land and erect dams for irrigation purposes.

An Eastern mining display, advocated by W. H. Porter, of Chicago, was also endorsed. It is proposed to go before Congress and ask for the appropriation of a sum to assist in making a display in either New York or Boston that will give an adequate idea of the richness of the West, something tangible that will interest and attract capital from the East. It is proposed to make the exhibit permanent, if possible, and to operate it under the auspices of the mining Congress to give it stability and standing in the eyes of the investor.

The matter of the protection of desert water supplies came in for considerable discussion, and the Government was asked to put it in charge of the Geological Survey, which, in turn, is requested to erect iron signs in the vicinity of all water locations to guide the prospector and at the same time warn the trespasser that it is a serious offence to contaminate these supplies. Legislation in this line is asked from Congress.

Among the papers before the congress was one from Chas. D. Walcott, director of the Geological Survey, and another from C. W. Hayes, geologist in charge of economic geology, in the service. Mr. Walcott, while strongly in favor of either a bureau of mines or a department of mines, says that the European mining laws, sometimes used as an argument in favor of a change in the United State laws, are not any better than, if as good as, the laws of the United States; that they were enacted more to enforce certain restrictions about the miners, which the various States exercised in the United States. A summary of Mr. Hayes' paper was published in the last issue of the JOURNAL.

E. W. Parker, of the Geological Survey, read an interesting paper on the results of Government experiments in testing coal at the St. Louis testing plant. He says that some of the results have been most interesting and even revolutionary in character. The results showed that power generation by steam required two and one-half times as much coal as where the power was generated by gas. In a recent run of 120 hours, the amount of coal consumed per horse-power-hour by the gas-engine was about one-fourth the best record made by the steam-engine plant. But what is of greater value than this has been the demonstration that some of the lignites of the western States can be utilized to great advantage in the gas producer, yielding even a higher grade of gas than can be obtained from bituminous coal, and producing through the gas-engine plant as much power per unit of fuel used as was obtained from the higher grade of bituminous coal under the boilers.

A. J. Hoskin, United States deputy surveyor of Colorado, spoke of the inaccurate surveys which have given the miner much trouble. He says the Government should remedy this by establishing suitable lines and corners, marked by iron monuments instead of mountains, cañons and trees, as has been done in the past, and urges that the Government at once take the work in hand, make a re-survey of the entire West, giving each owner a correct map and location of his claim.

Frank W. Wire, of Illinois, made a strong plea to the Congress to help hunt down the dishonest promoter. The public does not mind giving a promoter his share, but he must promote an honest proposition, he declared. The Congress went on record as never before in its earnest condemnation of dishonest claims in regard to mines and prospects, and declared its intention to wage unrelenting and unceasing warfare against "grafters" and dishonest men who get into the field and attempt to float unreasonable and unprofitable schemes.

PREVENTION OF MINING FRAUD BY STATE LEGISLATION.*

BY LEWIS E. AUBURY.

Now that mining is attracting more attention than probably any other industry, in my opinion a necessity has arisen for the enactment of stringent laws to protect the investor in mining properties. Had such been passed a generation ago, mining would not now be suffering to such an extent from unscrupulous promoters. The task of suppressing the illegitimate operator is such a stupendous one that, while the Postal Department is using the best means at its command to presecute persons for the fraudulent use of the mails, strong efforts should be made either to extend aid to that Department or to enact such State laws as will provide for the prosecution of the fraudulent promoter where glaring misrepresentations are made by him.

You are probably all familiar with the style of prospectus with which this class of promoters flood the public, and of the losses sustained by credulous persons who have been induced to purchase stock through reading this glowing literature, but few recognize the great injury to mining investments which has been accomplished in this country by the fake promoter. We can see the result in the millions of dollars which are at present passing us and seeking investment in Mexico, in South America and in British possessions.

Not until confidence in our mines has been re-established by the passage of such laws as has been suggested, so that the investor can feel that he will be protected, do I look for the tide to turn our way. As it is, the investor with no knowledge of mining is not generally able to distinguish the good from the bad, and does not realize the necessity for securing expert opinion before investing. He listens to the tale of the wily faker, who speaks of guaranteed dividends, fabulous assays, etc., but obtains expert advice only after he has invested and when the promises made him fail to materialize. He then for-

*Paper read before the American Mining Congress at El Paso, Tex., Nov. 14-18, 1905.

ever abjures mining and mining operators, and loses no opportunity to condemn them. If, on the other hand, he had made a profitable investment in a legitimate enterprise, there is a strong probability that his capital could again be enlisted in mining, and the industry would have a friend instead of an enemy.

At the last session of the California legislature, I had the honor of presenting a bill, aiming to put a stop to fraudulent practices, which became a law. It provided that any officer, or anyone pretending to be an officer, or in any way connected with a mining company in California, who should publish or subscribe to misleading statements as to the condition or prospect of a mining venture, should be deemed guilty of a felony, and on conviction thereof should be punished by imprisonment in State prison, or a county jail, not exceeding two years, or by fine not exceeding $5,000, or by both.

Since the passage of the bill the fraudulent and exaggerated prospectus has nearly disappeared from California, and the faker has gone to other fields. I have been informed that the State of Washington has enacted a similar law.

The Canadian Geological Survey in 1905.

The survey devoted a large part of its energy during the past summer to the study of coal and coal mining. Theophile Dennis visited the colieries of Alberta, along the Canadian Pacific, and will add this information to a bulletin, already complete as to the maritime provinces, on coal and coal-mining methods in the Dominion. D. D. Cairns, on the east, and D. B. Dowling, on the west of the divide, studied the geology of the coal regions of the Rockies. H. S. Poole and R. W. Ells visited, respectively, the coalfields of Vancouver and of Graham island. The inhospitality of the mine-owners to a large extent prevented their investigation.

Reconnaisance and topographical surveys also received some attention. Charles and Frank Camsell made an arduous trip from Dawson nearly to the Arctic ocean, along the Peel river; while R. G. McConnell made a geological survey of southwest Yukon territory, including the mining districts of Atlin and Windy Arm.

R. W. Brock made a structural survey of part of Rossland camp, paying careful attention to the Center Star and the War Eagle mine.

Dr. Bell, the acting director, secured an appropriation of $19,000 for special use in British Columbia and the Yukon, in addition to the regular allowance of $60,000 for the survey work, and the same extra amount for the same purpose has been granted for the coming year.

Britannia ware is soldered by means of a blowpipe and a flux composed of 4 parts of glycerin and 1 part of muriatic acid.

New Publications.

Journal of the Royal Society of New South Wales. Vol. XXXVIII. Pages, 476. Illustrated. 5½ by 8½ in.; cloth. Sydney, 1904: Published by the Society.

California Mines and Minerals. Bulletin No. 41, California State Mining Bureau. By Charles G. Yale. Pages, 52. Illustrated. 5½ by 9 in.; paper. Sacramento, Cal., 1905: State Printing Office.

Geology and Underground-Water Condition of the Jornada del Muerto, New Mexico (Water-Supply and Irrigation Paper, No. 123, United States Geological Survey). By Charles R. Keyes. Pages, 40; with illustrations and maps; 5¾ by 9 in., paper. Washington, D. C., 1905, Government Printing Office.

Field Assay of Water. By Marshall O. Leighton. Water-Supply and Irrigation Paper No. 151. Series L, Quality of Water, 11. 76 pages; illustrated. 6 by 9 in.; paper. Washington, D. C., 1905: Government Printing Office.

Contents: Field determinations. Suspended matter. Color. Iron. Chlorides. Hardness. Instruments and reagents.

The Production of Borax in 1904. By Charles G. Yale. Reprint from U. S. Geological Survey Report, *Mineral Resources of the United States.* Pages 14; 6 by 9 in.; paper. Washington, D. C., 1905: Government Printing Office.

California affords the entire domestic production of borax. The output of crude borax ore in 1904 was 45,647 short tons, valued at $698,610, a slight increase over that of the previous year. The report covers the occurrence of borax minerals and their distribution in California, the processes of mining and of refining borax, and the uses made of the salt.

Machine Design. By Albert W. Smith and Guido H. Marx. Pages, 369 + viii; illustrated. Octavo, 6 by 9 in.; cloth, $3. New York, 1905: John Wiley & Sons. London: Chapman & Hall, Ltd.

Contents: Preliminary. Motion in mechanisms. Parallel or straight-line motions. Cams. Energy in machines. Proportions of machine parts as dictated by stress. Riveted joint. Bolts and screws. Means for preventing relative rotation. Sliding surfaces. Axles, shafts and spindles. Journals, bearings and lubrication. Roller- and ball-bearings. Couplings and clutches. Belts. Fly-wheels. Toothed wheels or gears. Springs. Machine supports. Machine frames. Appendix. Index.

Theory of Structures and Strength of Materials. By Henry T. Bovey. Pages, 968; illustrated. 6 by 9 in., cloth; $7.50. New York, 1905: John Wiley & Sons. London: Chapman & Hall, Ltd.

Contents: Framed structures. Shearing forces and bending moments. Momentum, energy, balancing. Stress, strain, elasticity, vibration, thin cylinders. Stresses, strain, earthwork and retaining walls. Friction. Transverse strength of beams. Pillars. Torsion. Bridges. Suspension bridges. Arches and arched ribs.

This is the fourth edition of a book that is well and favorably known; it is of greatest value as a text-book, for which purpose if not rated so high as Stoney, DuBois or Greene, it yet ranks with Merriman, Johnson and the more modern writers on the same subjects. The new edition is practically a new book; the chapters have been rewritten, and there is a decided gain in clearness.

Radium and Radio-Active Substances. By Charles Baskerville (professor of chemistry, College of the City of New York). Pages 164, with illustrations; 6 by 9 in.; cloth, $1. Philadelphia, 1905. Williams, Brown & Earle.

This timely little treatise on the most marvelous products of chemical discovery of recent years, is stated on the title page to be framed especially in "their application to medicine." This feature of the book, however, is limited to the last fourth, the first three-fourths being devoted to a most readable statement of the nature, history and identification of radioactive substances. For reliability, thoroughness and ease of reference, this book is recommended as a reference manual on a subject which is not always treated accurately outside of the technical press. Dr. Baskerville has done an admirable service in his compilation of information on radium.

New Railroad and County Products Map. —West Virginia Geological Survey, 30x 42 in.,, 50c. Morgantown, W. Va., 1905: West Virginia Geological Survey.

This map shows all the railroads of the State and their routes to the seaboard and lakes, either completed or under definite construction up to October 1, 1905. The main trunk lines and their branches are printed in separate colors so as to indicate at a glance the shortest and best routes for shipments, etc. Also the chief products of every county in the State are shown by counties on the margin of the map. The coal, oil, and gas areas of the State are not indicated on this map since the attempt so to do would have obscured the railroad colors and led to confusion.

The Survey has also issued several other excellent monographs and maps; which we list below:

Coal, Oil and Gas Map of the State, issued under date of Feb. 1, 1904. 50c.

Volume I-(a), Petroleum and Natural Gas, 625 pages, issued under date of July 1, 1904. $1.

Volume II, Coal, 725 pages, issued June 15, 1903. $1.50.

Bulletin No. 1, Bibliography and Cartography, 83 pages. 10c.

Abstracts of Official Reports.

Brunner, Mond & Co., Ltd.

Attention has been drawn of late to the companies engaged in the chemical industry. All chemical manufacturers have been experiencing good times of late. One cause is the remarkable activity of the cotton industry, in which bleaching powder is used. Brunner, Mond & Co., Ltd., anounces an interim dividend at the rate of 35% per annum. Twelve months ago the interim dividend was only at the rate of 30% per annum. In addition to this, however, a special distribution is to be made.

Since Jan. 1 of this year the £1 ordinary share of the company has been quoted as high as £8. The rise has chiefly occurred during the last few weeks. The circular announcing the dividend explains this. The directors have resolved, "in order to meet present and prospective capital expenditure, to make a call of 10s. per share on the £1 ordinary shares (upon which 10s. per share has been paid up). Formal notice of the call will be issued shortly. In December next an ordinary general meeting will be held, at which the directors will propose to apply a portion of the undivided profits (that is to say, a portion of the reserve fund) in payment of a special dividend of 33⅓% to the holders of the ordinary shares. This dividend will be payable in cash, but each shareholder will have the right to elect to take, in lieu of cash, £1 ordinary shares at par, to be issued as fully paid and to rank for dividend from Jan. 1, 1906. In case he should so elect, the directors will apply the dividend in payment for the shares."

The company is making large profits, and the directors see their way to making still larger ones. This company, starting in 1881 with a comparatively small capital (£600,000), now ranks as one of the biggest in the United Kingdom.

To show the progress made for the past eight years we give herewith a statement of capital, profits, and rate of dividend paid on the ordinary share.

Year ended Mar. 31	Capital Expenditure.	Share Capital £	Profits £	Ordinary Dividend %	Reserve Fund £
1898 ..	1,861,930	1,676,850	330,458	25	586,000
1899 ..	1,924,002	1,676,850	412,697	30	586,000
1900 ..	2,022,674	1,743,865	435,060	35	632,910
1901 ..	2,236,114	1,868,094	475,601	35	725,000
1902 ..	2,339,498	1,967,519	543,085	32½	725,000
1903 ..	2,375,724	1,967,519	591,070	30	850,000
1904 ..	2,384,939	1,967,519	613,922	30	1,000,000
1905 ..	2,292,774	1,967,519	684,986	35	1,000,000

One reason for this success is the sound financial policy that has always been carried out by the directors. The directors of Brunner, Mond & Co., Ltd., have recognized new inventions and more efficient methods, and have accordingly followed a policy which has given them command of ample funds. Another is that the company has built up a reserve fund of £1,000,000.

We give herewith a statement of liabilities and assets as on March 31 last:

Liabilities	£	*Assets*	£
Share capital	1,967,519	Land, alkali and salt works, &c.	2,292,774
Reserve fund	1,000,000	Investments	578 553
Suspense acc't.	48,090	Patents account,	20,962
Sundry credit'rs	190,028	Stocks, steamers, &c.	354,203
Profit and loss account	346,873	Sundry debtors	232,203
		Cash in hand	73,815
	4,552,510		3,552 510

With the satisfactory outlook for the chemical trade generally, the shares of this company appear worth their present prices.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specificatians of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended Nov. 21, 1905.

804,841. ORE-SLIME SEPARATOR.—Eric Hedburg, Joplin, Mo., assignor, by mesne assignments, to American Reduction Company, Chicago, Ill., a corporation of Arizona.

804,870. ORE-DISTRIBUTING CAR.—Ralph S. Moore, Portsmouth, Ohio.

804,883. FURNACE.—William B. Ruggles, Bayonne, N. J., assignor to Ruggles-Coles Engineering Company.

804,894. BURETTE.—Anders M. Soederlund, Goeteburg, Sweden, assignor to Gosta Gabriel Gustafsson Oxenstirena, Philadelphia, Pa.

804,904. CHUCK FOR ROCK-DRILLS.—James C. H. Vaught, Deadwood, S. D.

804,931. APPARATUS FOR ELECTROLYTICAL DECOMPOSITION.—Gunnar E. Cassel, Stockholm, Sweden.

804,936. METALLURGICAL PROCESS.—Willis E. Everette, Tacoma, Wash.

804,993. MINER'S PICK.—David J. Andrews, Brighton, Aa.

805,009. PROCESS OF MAKING HYDROCHLORIC ACID.—Willis E. Everette, Tacoma, Wash.

805,017. METAL-LEACHING PROCESS.—Thomas B. Joseph, San Francisco, Cal.

805,024. REVERSING-VALVE FOR REGENERATIVE FURNACES.—John B. Nau, New York, N. Y.

805,030. DRYING-RETORT FOR PEAT.—Carl A. Sahlstroem, Ottawa, Canada.

805,031. PROCESS FOR PREPARING ZINC AND ALUMINUM PLATES FOR PRINTING PURPOSES.—Ernst O. Schmel, Leipsic, Germany.

805,041. HEATING-FURNACE.—Charles P. Turner, McKeesport, Pa.

805,054. GLASS-WORKING APPARATUS.—Irving W. Colburn, Franklin, Pa.

805,055. GLASS-DRAWING APPARATUS.—Irving W. Colburn, Franklin, Pa.

805,056. PROCESS AND APPARATUS FOR DRAWING GLASS.—Irving W. Colburn and Clifton W. Irwin, Franklin, Pa.; said Irwin assignor to said Colburn.

805,065. MANUFACTURE OF GLASS ARTICLES.—Halbert K. Hitchcock, Akron, Ohio, assignor to himself and Charles W. Brown, trustees, Pittsburg, Pa.

805,066. GLASS-PRESS.—Halbert K. Hitchcock, Akron, Ohio.

805,067. MECHANISM FOR FEEDING GLASS.—Halbert K. Hitchcock, Walton, Pa., assignor to himself and Charles W. Brown, trustees, Pittsburg, Pa.

805,068. FEEDING GLASS.—Halbert K. Hitchcock, Walton, Pa., assignor to himself and Charles W. Brown, trustees, Pittsburg, Pa.

805,069. KILN FOR ANNEALING GLASS.—Halbert K. Hitchcock, Tarentum, Pa.

805,070. RUNWAY FOR ANNEALING GLASS.—Halbert K. Hitchcock, Tarentum, Pa.

805,090. AMALGAMATOR.—Charles W. Patten, Lynn, Mass.

805,095 METHOD OF MAKING OXIDE-COATED SHEET METAL.—Ambrose Ridd, Newport, Ky.

805,106. PLANT FOR MAKING BRIQUETTES.—John Treadwell, San Francisco, Cal.

805,139. MANUFACTURE OF GLASS.—Halbert K. Hitchcock, Walton, Pa., assignor to himself and Charles W. Brown, trustees, Pittsburg, Pa.

805,186. FURNACE-FRONT.—John Bishop, Bartow, Fla.

805,213. ROTARY KILN.—James H. Logan and William H. Simmons, Fenton, Mich.

805,215. ORE-CONCENTRATOR.—Matthew R. Lyle, Oakland, Cal.

805,228. EXCAVATOR.—William H. Onion, New Orleans, La.

805,229. APPARATUS FOR TREATING SLIMES.—Edward Parrish, Newport, R. I.

805,235. PRODUCER-GAS FURNACE.—Paul Schmidt and Adolphe Desgraz, Hanover, Germany.

805,242. FIREPROOF QUARTZ BRICK OR BLOCK.—Ernst Stoeffler, Zurich, Switzerland.

805,289. MAGNETIC SEPARATOR.—Harry E. Heath, Windsor, Conn., assignor to General Electric Company, a corporation of New York.

805,302. PRODUCING QUARTZ - GLASS FREE FROM AIR-BUBBLES.—Richard Küch, Hanau, Germany, assignor to the firm of W. C. Heraeus, Hanau, Germany.

805,304. METHOD OF PROTECTING QUARTZ-GLASS VESSELS. — Richard Küch, Germany, assignor to the firm of W. C. Heraeus, Hanau, Germany.

805,316. ART OF PRODUCING METALLIC IRIDIUM.—Herschel C. Parker, New York, N. Y., assignor to Parker-Clark Electric Company, Jersey City, N. J., a corporation of New Jersey.

805,372. REGENERATIVE MUFFLE-FURNACE.—William R. Miller, Pittsburg, Pa., assignor to the Forter-Miller Engineering Company, Pittsburg, Pa., a corporation of Pennsylvania.

805,374. APPARATUS FOR PURIFYING WATER.—Joseph H. McDonald, New York, N. Y.

805,382. PROCESS OF CONCENTRATING ORES.—Walter M. Sanders, Iola, Kan.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended Nov. 11, 1905.

21,562 of 1904. WHITE-LEAD PROCESS.—C. P. Townsend, Washington, U. S. A. In the electrolytic production of white lead, the provision of a diaphragm which prevents any lead salts getting to the cathode.

21,755 of 1904. BRIQUETTE MAKING.—L. Marton, Budapest, Hungary. The use of starch and gluten for binding briquettes of coal or ore.

22,422 of 1904. RECOVERY OF VANADIUM.—P. Auchinachi, Wrexham. Vanadium ores are mixed with an equal weight of concentrated sulphuric acid and boiled for several hours, afterward the mixture is removed and diluted with four times its volume of water and the sulphate of vanadium solution obtained; this is afterward treated for the precipitation of oxide, which is afterward smelted for the metal.

24,042 of 1904. BRIQUETTE MOLD.—V. M. Crawford, London. A hot press for molding peat into briquettes.

25,469 of 1904. SAFETY CATCH FOR MINE CAGES.—W. D. Trick and G. Eadon, Swansea. Improved gripping apparatus for mine cages, to prevent accidents from over-winding and from the breakage of the rope.

26,881 of 1904. RECOVERY OF VANADIUM.—A. H. Perret, Paris. Treating vanadium ores by mixing with fused bisulphate of soda, and then calcining the residue and dissolving out the vanadates with water, afterward recovering the vanadium by means of ammonia.

347 of 1905. AGGLUTINANT FOR COAL.—R. Middleton, Leeds. The use of boiled linseed or other oil as an agglutinant for coal.

681 of 1905. FENCE FOR MINE CAGES.—H. Houghton, Skelmersdale, Lancashire. Improved fence for mine cages.

3,231 of 1905. SAFETY-LAMP REFLECTOR.—J. Clarke and E. Barraclough, Featherstone, Yorkshire. In miners' safety-lamps, the provision of a reflector for reflecting more of the light in an upward direction toward the roof.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Leo von Rosenberg was in Denver last week.

Mr. G. H. Cramer is now located in the Mayer district, Arizona.

Mr. G. M. Gouyard, of Denver, is in Sonora, Mexico, on professional work.

Mr. Willard P. Ward, of New York, is at present in Colorado on professional business.

Mr. W. R. Ingalls, of New York, arrived home, Nov. 27, from a tour in British Columbia.

Dr. G. W. Maynard has returned to New York from a professional trip to Mexico and Arizona.

Mr. Francis A. Thomson was lately in Tonopah, Nev., engaged in examination work for Boston clients.

Mr. J. W. Finch returned to Denver from Mexico last week and left a few days later for Goldfield, Nevada.

Mr. E. C. King, lately connected with the Arizona smelter, has resigned and is at present at Blanchard, Arizona.

Mr. J. C. Foley, of Sault Ste. Marie, has been appointed manager of the Shakespere gold mine, Webbwood, Ontario.

Ex-Governor Murphy leaves Prescott, Ariz., shortly, for New York, on business concerning his many interests in Arizona.

Mr. Hudson H. Nicholson has returned from an extended trip through southern Mexico in the interests of Eastern clients.

Mr. Louis S. Cates, of Boston, has gone to southern Utah and Nevada, to examine mining properties for Mr. Samuel Newhouse.

Mr. W. H. Brulé has been appointed metallurgist of the reduction plant of the Daly Reduction Co., at Hedley, British Columbia.

Mr. H. H. Henshaw, general manager of the Allis-Chalmers-Bullock Co., of Canada, has severed his connection with the company.

Mr. Jonathan Gordon, late of Mexico, is now located at Mayer, Ariz., and is the chemist and assayer at the Ruby Reduction Works at that place.

Capt. James H. Gribble, who has been in charge of the underground work at No. 5 shaft of the Tamarack Mining Co., for 25 years, has resigned.

Mr. Howard Smith, of the firm of Janin, Stebbins & Smith, of San Francisco, has just returned from examining mining properties in Arizona.

Mr. P. Kirkgaard, of Deloro, Ont., has been visiting New York on professional business. Mr. Kirkgaard recently passed some time in the Cobalt district.

Mr. Joseph Beech, of London, Ont., has gone on a tour of inspection of the Osage oil properties, Indian Territory, in which many London people are interested.

Mr. Philip Argall, of Denver, who has been making an investigation of the zinc resources of British Columbia in behalf of the Canadian government arrived home Nov. 20.

Dr. Robert Bell, acting director of the Canadian Geological Survey, has gone to Cobalt, Ont., to examine the silver-cobalt mineral deposits and investigate mining conditions.

Mr. Jos. B. Tomlinson, of the firm of Tomlinson & Norton, Cananea, Sonora, Mexico, is making examination of mining property in the Quijotoa mountains, southwestern Arizona.

Mr. George M. Anderson, formerly of White Sulphur Springs, Montana, is now manager of the Gold Quartz Mining Co., which has its office in Butte; the mine is at Beowawe, Nevada.

Mr. G. L. Mackenzie, who was manager of the Van Anda mine, on Texada island, British Columbia, until the close of 1904, going thence on a trip to Mexico, is now in Dumfries, Scotland.

Mr. William R. Wade has resigned his position with the New Jersey Zinc Co., at Franklin Furnace, N. J., and is now superintendent of the Azure Mining Co., at Silver City, New Mexico.

Dr. C. H. Gordon has been engaged for several months in investigating the geology of the Magdalena and Black Range districts, New Mexico, on behalf of the United States Geological Survey.

Mr. O. H. Fairchild, manager of the Bonanza Mining Co., Big Bug, Ariz., leaves shortly for Boulder, Colo., to superintend the erection of the Inter-Ocean Mining Co.'s new cyanide mill there.

Mr. F. F. Fuessenich was in Arizona recently, looking over the Sorenson mine, near Windsor, and spent some time there overlooking the new cyanide plant, and returned home to Torrington, Conn.

Professor Dmitri Ivanovitch Mendeléeff, of St. Petersburg, has been awarded the Royal Society's Copley medal, in recognition of his many valuable contributions to chemical and physical science.

Mr. Clifford Richardson, of New York, presented a paper on the "Constitution of Portland Cement" before the Engineering Section of the Franklin Institute on Nov. 23, which was illustrated with lantern slides.

Mr. P. A. Babb, who has mined extensively in Utah and Colorado, and for the last five years has been with the Guggenheims in Mexico, has opened an office in the City of Mexico as consulting engineer and mining geologist.

Mr. John S. Jones, president and general manager of the Jessie Mines Co., Big Bug district, Yavapai county, Arizona, expects to start for New York within a few days to make final arrangements for a 60-ton mill for his company.

Mr. W. E. Sost, formerly with the Santa Rosalia smelter, Chihuahua, Mexico, has taken the position of agent, with the American Smelting & Refining Co., at Parral, relieving Mr. C. G. Baker, who has been transferred to Monterey.

Mr. Charles Schwab, R. R. Brown, of Pittsburg, and other capitalists of that city, recently visited Santa Eulalia, Chihuahua, with a view of making an examination of the Galeana and other mines of the San Toy Mining Company.

Mr. R. T. White, mining engineer, formerly of Butte, Mont., and who until recently has been identified with the copper interests represented by Frank Klepetko, has accepted a position with a California company, owners of the Balakalala mines.

Mr. H. B. Wright, of Fernie, East Kootenay, B. C., has resigned the position of chief engineer to the Crow's Nest Pass Coal Co., in the Crow's Nest Pass coalfields. Extensive construction work was done during the several years Mr. Wright held the post he is now vacating.

The partnership heretofore existing under the name of Little & Walker, as consulting chemists, is dissolved by mutual consent. Mr. Arthur D. Little will continue the business at the present office of the firm, 93 Broad street, Boston. Mr. William H. Walker will carry on a consulting business at 24 Trinity place, Boston.

Mr. Wm. M. Brewer has been the recipient of a handsome sold gold fob from the American Institute of Mining Engineers, which present was accompanied by a letter from Theo. Dwight, assistant secretary, stating that this memento was sent by the members of the Institute in recognition of the acceptable manner in which Mr. Brewer had fulfilled the position of secretary of the Central Committee during the British Columbia meeting and Alaska excursion, held in July, 1905. Enameled on one side of the gold pendant are the Stars and Stripes and Union Jack and on the reverse side the badge of the Institute, with Mr. Brewer's initials in raised letters.

Obituary.

Harry B. Porter, who owned three mines in the Klondike, died Nov. 18, in the Post Graduate Hospital, in New York, following an operation for cancer. He was forty-two years old, and left the

Klondike to visit relatives and friends and to come to New York for an operation, which was performed Friday, November 17.

Alexander Mackenzie, a well-known mining engineer of Montreal, died at his home in that city Nov. 15, aged 76. He had been in poor health for about two years. Mr. Mackenzie was a native of Inverness, Scotland, and during his earlier career was a sheep farmer in Australia. Sustaining heavy losses in this business, he engaged in gold mining when the excitement over the Australian goldfields was at its height. He subsequently came to Canada and was for a time on the staff of the Geological Survey. Mr. Mackenzie specially devoted himself to gold mining and was actively concerned in the development of gold deposits in Beauce, Quebec; in Nova Scotia, and in the Michipicoten region of Ontario. He had a wide connection among mining men both in Canada and the United States.

William Orr, widely known as a metallurgical engineer in the United States, and lately general manager of the Gold & Silver Extraction Company of America, died at Denver, Colo., on Nov. 20, at the age of 36 years. Mr. Orr, who was born in Scotland, came to the United States in 1894, being sent out from the Glasgow laboratory of the companies owning the MrArthur-Forrest cyanide patents. He entered the employment of the Gold & Silver Extraction Company as a cyanide expert, being engaged in the testing of ores and the supervision of plant installations at various points in the West. Through his energy, ability, and high professional attainments, he rose rapidly in the service of his company, and a few years ago became its general manager. He won a high reputation as a cyanide specialist, and personally was highly appreciated for his quiet and kindly manner, which gained him many friends all over the West.

Societies and Technical Schools.

Technological Society of Kansas City.—This society has been organized at Kansas City, Mo., and has already held several meetings. The officers are: President, Jean Robert Moechel; vice-president, M. P. Paret; secretary, Benton Lowther; treasurer, Albert E. Lombard.

Massachusetts Institute of Technology.—Professor Sauveur, of Harvard University, is giving a course of six lectures on metallography to the seniors of the mining course. Professor W. O. Crosby is at Nome, Alaska, engaged in professional work. It is expected that Professor Crosby will return to Boston in December, and he will then resume his classes in economic geology.

Professor Ostwald, of the University of Leipsic, the noted authority upon chemistry, is giving a course of five lectures in German upon "The Historical Development of Chemistry," to the members of the chemical and chemical engineering courses at the Institute.

Worcester Polytechnic Institute.—By the will of the late Stephen Salisbury the Worcester Polytechnic Institute at Worcester, Mass., receives a bequest of $200,000. This money comes without restrictions of any kind on the part of the testator. In addition to this bequest Mr. Salisbury, at the time of his resignation a few weeks ago from the presidency of the board of trustees, made an additional gift to the Institute of $100,000, to be paid immediately.

Trade Catalogues.

The Fairbanks Morse Co., Chicago, Ill., issues a catalogue of gasoline motor cars for railroad work.

The Chicago Pneumatic Tool Co., New York and Chicago, issues its catalogue No. 18, entitled, "Rock Drills."

The Michigan Standard Grinding Machine Co., Detroit, Mich., issues a flyer describing its crushers and pulverizers.

"Water Lifted by Compressed Air," is the title of the new catalogue No. 73, of the Ingersoll-Sergeant Co., New York.

The C. W. Hunt Co., West New Brighton, N. Y., issues its new catalogue No. 058, describing its steam hoisting engines.

"Northern Motors in Hoisting Service," is a new flyer, just issued by the Northern Electrical Manufacturing Co., Madison, Wis.,

The Jeffrey Manufacturing Co., Columbus, Ohio, issues its catalogue No. 20 describing coal-handling machinery as used at the mines.

Industrial.

The Sullivan Machinery Co. has removed its St. Louis office to the Missouri Trust Building. P. F. Jarvis is manager.

The Hendrick Manufacturing Co., Carbondale, Pa., is enlarging its facilities for handling trade. Byram C. Guerin is in charge of its New York office at 149 Broadway.

The Crocker-Wheeler Co., Ampere, N. J., has established a department of "industrial engineering," which is under the direction of J. K. W. Davenport. The object is the supply of sound engineering advice to the purchaser of apparatus.

C. S. Powell, general agent of the Westinghouse Electric & Manufacturing Co., has removed to the offices of the company on the 19th floor of the Trinity Buliding, 111 Broadway. The Westinghouse Electric & Manufacturing Co., in addition to their offices in the Hanover Building, at 11 Pine street, occupies the entire 19th floor of the Trinity Building.

The Bury Compressor Co., of Erie, Pa., reports recent orders from the following companies: Ball Engine Co., Erie, Pa.; Parish & Bingham Co., Cleveland, O.; Erie City Iron Works, Erie, Pa.; American Steel & Wire Co., Cleveland, O.; E. W. Bliss Co., Brooklyn, N. Y.; Edw. E. Rieck Co., Pittsburg, Pa.; Macbeth Evans Glass Co., the Elwood, Ind., plant; Morgan Engineering Co., Alliance, O. A recent foreign order is for a compressor, 135 ft. capacity, driven by a Westinghouse A. C. motor.

It is understood that negotiations are now entirely dropped for the long-discussed merger of the United Lead Co. and the National Lead Co. The United Lead Co. is now proceeding with the construction of the plants upon which work was suspended because of the opening of negotiations with the National Lead Co. These negotiations have been on and off a number of times during the last year. Work has been resumed on the construction of the United Lead Co.'s plant at St. Louis. When the company's plans are completed it will also have a plant at Chicago.

A large body of land, approximating 2,500 acres, located on the shore of Lake Michigan, in the State of Indiana, has recently been acquired in the interest of the United States Steel Corporation or its subsidiary companies. The Illinois Steel Co. will probably in the near future make important improvements on this property for manufacturing purposes. The extent of the improvements will depend upon the attitude of the public authorities in Indiana and Illinois, respectively. Formerly the concentration of plants of this company has been carried out at its location at South Chicago. During the past ten years its works, known as North Works and Bridgeport Works, located within the city limits of Chicago, have been partially removed to the South Chicago location. This location is well adapted to its business in many ways, and the same would be further developed if there were sufficient room at that point.

Construction News.

Joplin, Missouri.—The Hawkeye Zinc Mines Co. will erect mills.

Austin, Texas.—A company is being organized to develop sulphur deposits and build a sulphur refinery in El Paso county, according to the local press, but the names of the interested parties are not stated.

Wall Street, Colorado.—The Penn Mining & Milling Co. has decided to put up a 10-stamp mill and concentrator for treating the ores of its mines. W. A. Jumps, Wall Street, Colo., is superintendent.

Fort Smith, Arkansas.—It is reported that the Iowa Iron Works will establish a plant for the manufacture of ore cars, mining machinery and mining tools. A foundry will also be established for making castings.

Uniontown, Kentucky.—The Southern Tidewater Co. will sink a new four-compartment shaft at a cost of $56,000, with a capacity for handling 3,000 tons of coal daily. T. A. Taylor, Memphis, Tenn., is general manager.

Gainesville, Tex.—The Bomar County Oil Co., with $100,000 capital stock, has been incorporated by J. C. Whaley, D. T. Lacy, Val Peers, F. R. Sherwood, F. A. Jones, E. P. Bomar, of Gainesville, and R. F. Heflin, of Sherman, Texas, to drill for oil.

Etna, Georgia.—Pittsburg (Pa.) and New England capitalists have purchased 10,000 acres of hematite ore land, which will be extensively developed. Furnaces will be established later. William Bell Lowe, 42 Broadway, New York, can give information.

Eureka, Nevada.—The Richmond Eureka Mining Co. is to instal two sinking and two station pumps, with an aggregate capacity of 1,800 gal. per min. Geo. K. Fischer, 17 Battery place, New York, is engineer and has specifications for these pumps ready for bids.

Middlesboro, Kentucky.—The Shamrock Coal & Coke Co. has been organized, with J. L. Manring, president; J. H. Ralston, vice-president and treasurer; and William Costello, general manager; to mine coal and manufacture coke. The company has leased coal properties on Stony Fork, and will arrange at once for development.

Villa Rica, Georgia.—The Paulding Mining & Manufacturing Co. has been incorporated, with an authorized capital stock of $100,000, for the development of iron pyrites on 77 acres of land near Villa Rica. The company will erect mills to treat 50 tons of crude ore daily, giving 25 to 30 tons of finished product. Geo. H. Sims is trustee.

Glendon, North Carolina.—Col. D. P. Bible, of New York, has developed a large quarry and has a deposit of white talc exposed. He intends to erect a large milling plant on this property.

About a mile west, H. N. Bates, of Boston, Mass., has purchased a 70-acre tract, and has a force of men at work taking out the material.

Nashville, Tennessee.—The Tennessee Land & Coal Co., J. E. Jones, president, proposes to develop timber, coal and oil lands, and has purchased a controlling interest in the Obeds River Oil Co., of Poplar Cove, Tenn., and the Federal Oil Co., of Wayne county, and a one-half interest in the Poplar Grove Oil Co. in Fentress county; R. J. Moscrip, Maryland, Tenn., is engineer in charge.

Terra del Fuego.—The Argentine Tierra del Fuego Exploration Co., capital $1,000,000, has been formed in Argentina, to prosecute mining and exploration operations in Terra del Fuego. They will be buyers of mining supplies. Catalogues of mining materials and of suitable supplies may be addressed to The Argentine Terra del Fuego Mining Co., care of Banco de Italia, Buenos Aires, Argentina.

Port Clinton, Ohio.—The American Gypsum Co., of this place, E. L. Devore, manager, intends to build a large plaster mill, and will require a power plant, mine and mill equipment, pumps, electrical machinery and supplies, conveying and elevating apparatus, calcining kettles, crushing and pulverizing machinery, engines and boilers. It invites information and prices on the machinery mentioned.

Independence, Missouri.—The Kansas City Portland Cement Co. has had plans prepared for the following buildings—clinker mill, stone dryer, raw mill, kiln building, cement stockhouse, limestone stockhouse, coalhouse, engine-house, crushed-shale stockhouse, stone-crusher house and shale-crusher house, all to be of steel construction. A 2,000,000 gal. concrete reservoir will also be built. The plant will have a daily output of 1,200 bbl. of cement, and cost, including machinery, $750,000. W. H. Caffrey, Heist Building, Kansas City, Mo., is general manager.

Tolland, Colorado.—The Denver, Northwestern & Pacific Railway will let its contract for driving a tunnel through the main or Continental range, from a point three miles west of Tolland, in Gilpin county, Colo., the tunnel to be 2.6 miles long, 17 ft. high and 24 ft. wide, and at an elevation of 9,930 ft. It is expected that the contractors will have to be prepared to instal a $100,000 plant for the contract work and that it will take two years to complete the contract. This will give the Moffat road a direct line through the main range on its proposed route from Denver to Salt Lake and ultimately to the coast.

McCurtain, Indian Territory.—The Fort Smith & Western railroad, A. C. Dustin, president, Cleveland, Ohio, announces that it will construct 100 additional coke-ovens at this place, increasing the capacity of the plant from 7,000 to 48,000 tons per month. Mine No. 3 will be opened, employing about 40 men in its operation. The company will also purchase 100 box-cars of 80,000 lb. capacity. The increase in production of the coking plant is occasioned by heavy demands for coke from smelters in Colorado, Mexico and Kansas City, and gas plants in Texas and Louisiana. W. F. Crane, of Fort Smith, Ark., is general manager.

Special Correspondence.

San Francisco. Nov. 23.

The famous Rancho del Paso, stretching from the bank of the American river to the base of the foothills in northern Sacramento county, and comprising in one tract some 44,000 acres of land in a well populated territory, is about to be sold, and the best part of it may be given over to the dredger men for mining purposes. The ranch has long been known as the stock-breeding farm of James B. Haggin, formerly of San Francisco, but now of New York. The ranch lies in the form of an oblong, its greater dimensions being from north to south. It is about 17 miles long and 10 miles wide. Its southern boundary is irregular, extending along the north bank of the American river. A dozen minor streams, tributaries of the Sacramento and the American, furnish an ample water supply and there are few sections of the ranch lacking sufficient water for stock purposes. Of this immense area, including one-fifteenth of all the land in Sacramento county, about 10,000 acres are included in what is known as the bottom. It is a tract about 4 miles square, sloping gently to the river, and it contains some of the richest soil in the county. Along the southern edge of the bottom extends a strip one mile in width, which is planted with alfalfa and produces thousands of tons annually. For ten days or more a corps of mining men have been engaged in boring the rich bottom ground along the American river, in the hope that gold in sufficient quantity to pay for dredging may be found. If the tests prove up to expectations the low lands will be given over to a dredging company, and then will come to an end the most valuable portion of the great Haggin rach. Although the borers have been working for 10 days, the information they have gained about the mineral values in the soil is held a profound secret. The strip that is being pierced by the prospecting drills is between four and five miles long, and from three-eighths to three-fifths of a mile wide.

The Board of Supervisors of Trinity county has passed an ordinance limiting the amount of freight teamsters may haul during the rainy season to 4,000 lb. to the wagon. The ordinance will go into effect on Dec. 1, and the teamsters are now preparing to withdraw their freighting outfits. The prohibition holds good until May 1. The object of the new regulation is to prevent the cutting up of the roads during the rainy season. It is believed that Trinity county is the first in the State to pass such an ordinance. It meets with the general approval of the teaming contractors and the traveling public. The idea, if successful, may be carried out in other mining counties of the State where very heavy teaming in the winter season almost destroys the roads and entails much expense for repairs in summer.

The Golden Cross mines, at Hedges, in San Diego county, which have been in litigation for years, and only a few months since got out of the hands of a receiver, are again before the courts. A notice of pendency has been filed in the county recorder's office in one of the largest suits ever brought, involving San Diego property. The notice declares that the suit has been started in the circuit court of the United States. The title is the Golden Cross Mining & Milling Co. and J. M. Elliott versus the Free Gold Milling Co. and the Credit Commutation Co The notice declares that the suit brought in the circuit court is to foreclose a vendor's lien for $1,000,000 in deed of conveyance, dated June 26, 1897, in which the Golden Cross Co. was a party of the first part and the Free Gold Co. the party of the second part. It is declared that the property on which it is proposed to have the lien enforced consists of mines, mining claims, etc., at Hedges, San Diego county, known as Ingersoll, Beecher, Texas, Prita-Sappa, Leighton, Johnson, Emeline, Fuller, Los Angeles, Union, Dannebe, Talmage, Patsy Branigan, Blacksmith, Blackhawk, Baltimore, Golden Crown, Gray Eagle, Sutton, Henrietta, Golden Queen, Twilight, Golden Cross, Virginia, General Miles, Aladdin, Queen Extension or Duchess, Gray Duck, Tremalite and Gilt Edge; also all mills, cages, machinery, tools, implements and the entire plant on the mine, and claims and the pumping plant, reservoirs, pipes and pipe-lines in connection with the property.

Engineers are engaged in making surveys and plans for a new and extensive power plant to be located in the Feather river, near the old Golden Gate dam, about two miles above Oroville. Thomas Barbour, of the Risdon Iron Works, and his associates, own the land where the old barrier was situated, and for some time past he has had engineers at work drawing plans and making estimates on a concrete dam to be placed on the site of the old structure. He waited until the Western Pacific Railroad was an assured fact before going to any great expense on the proposition.

Los Angeles, every six months or so, projects a plan for a smelter which will compete for ores with the smelters at El Paso and San Francisco, and talk to this end is again going on at present. This time it is a new process of smelting by which no gases or fumes are formed. The San Pedro Chamber of Commerce committee has been conferring with the representatives of the Vacuum Smelter Co. that has proposed to put a smelting plant at the seaport town of Los Angeles. The smelter people have asked for a site of 25 acres, having free access to water.

The governor of California, after a long postponement, has appointed three new trustees of the State Mining Bureau. Curtis H. Lindley, author of a standard work on mining law, and also an investor in quartz and dredge properties, takes the place of T. B. Bishop; F. M. Bradley, the well-known mining engineer and dredge man, is appointed in place of J. E. Doolittle, deceased; and E. A. Stent, of Tuolumne county, former owner of the famous Jumper mine, takes the position of Frank Monaghan, of San Bernardino county. Harold T. Power, manager and principal owner of the famous Hidden Treasure drift mine, on the Forest hill divide, remains a trustee. The resignation of Fred. Harvey leaves but one more trustee to be appointed by the governor. It is understood that the new board may make some changes in the method of operation of the bureau, but what these are to be will not be known until after their official meeting.

Bisbee. Nov. 17.

A statement just made by the superintendent of the Copper Queen mines shows that for the year to date the average monthly production of ores from that mine has been 40,000 tons, that from this there has been made 54,000,000 lb. of copper since Jan. 1. The mine's monthly pay-roll amounts to $165,000. There are about 2,400 men employed underground and on surface; of these 6.3% are Mexicans, all on surface. The mine is using about 1,100,000 ft. of timber per month and for fuel about 7,000 barrels of crude oil and 100 tons of coal. The timber is mostly from the north Pacific and costs in the neighborhood of $22 per thousand. Since the beginning of operations at Bisbee this mine has produced 3,352,000 tons of ore, and its present monthly production is more than its average annual product was in the early years, 15 to 20 years ago, when it was making black copper from the oxide ores.

The Copper Queen smelter is now employing 1,750 men, and has a monthly pay-roll of $100,000. The proportion of Mexicans about the smelter is much greater than at the mines, for most of the common surface labor is done by them.

The Calumet & Arizona group, which is the second employer in this camp, has now a force of 1,500 men, and a monthly pay-roll of about $140,000. Of the labor at the mines 6% is Mexican, and, as at Copper Queen, there is a much greater proportion of Mexicans at the smelter. It is just six years since the first spade was struck in the ground at the original Calumet & Arizona workings, and from time to time since then various others of the properties of the group have commenced operations up to July, 1903, when the shaft at Junction was started. In all that time there have been developed more than 19 miles of underground openings. The Copper Queen, with its 25 years of life, has a total of active and caved underground openings of about 125 miles. The Calumet & Arizona has treated 520,000 tons of ore to date and has produced 82,000,000 lb. of blister copper, an average of slightly under 8% for the entire period. The average of production for the Copper Queen for its entire period of operation has been about 7½%. There is no camp in the world that can show such figures for so long a period or so large an output.

The various mines of the Calumet & Arizona group began operations at these dates: Calumet & Arizona, November, 1899; Calumet & Pittsburg, February, 1902; Lake Superior & Pittsburg, June 1902; Pittsburg & Duluth, March, 1903; Junction, July, 1903. Neither the American nor Warren development companies have yet begun any underground work, but one of them will do so shortly and the other early next year.

There are in Bisbee camp several other properties, all in the prospect stage, and the total monthly pay-roll of the entire camp is not far from $350,000. The leading one of these other properties is the Shattuck-Arizona, which has developed a large orebody, but is still drifting and sinking, with no thought of mining ore for some time to come. This company has spent about $130,000 in development, and nearly as much in the purchase of its claims. It has operated for only about a year, but has large orebodies of high values developed on the 700- and 800-ft. levels. Its associated company, the Denn-Arizona, has put in a modern equipment and is sinking a shaft, which is now down nearly 600 ft., to develop orebodies found by drill at about 900 ft. It has expended $160,000 in work and payment on claims.

An underground flow of water cut by a single drill hole in the Holt incline tunnel of Lake Superior & Arizona, at Florence, flooded the tunnel so fast that the men had scarcely time to get out, and the water rose to within 75 ft. of surface. This water is supposed to have come from a cavern and has now subsided. A car of 31 tons of selected ore, recently shipped to smelter, returned $73.90 net per ton, or $2,308 for the car, out of which there was $257 for freights. So far this company has forwarded 50 tons of ore, for which it has received $24,000 net, deducting all costs aside from mining. A call will be made on the stock of $1 per share, payment in January and later months.

A very valuable find of rich sulphide ore has been made above Duluth 1,250-ft. level, in a raise from that level.

The smelter at Benson, which is completed, shows no sign of operation, though there is plenty of ore in the tributary country that would be shipped there if it could be handled. This smelter was originally started as an oil affair, but the process did not work out, and a water-jacket rectangular furnace of aproved design was substituted.

The El Paso & Southwestern road is building a cut-off from French to this city, which will reach the mines more easi-

ly than the present main line, and will be of the utmost advantage to the Warren and American companies. This will be completed and in operation in January.

Flumes are to be built from the present northerly end of the main carrying water from Calumet & Pittsburg, Junction and Lowell, into the city, and to all mine shafts at Bisbee. It will first reach the Oliver, then the Irish Mag, then the Spray, Holbrook, Sacramento and Czar, and all water from both large companies will be taken to the farm south of Gold Hill.

Paradise, Ariz. Nov. 21.

The Savage Gold & Copper Co. is continuing the steady plan of development. The company expects to increase the force to 25 men.

The Cochise Consolidated Copper Co. is rushing work on the new concentrator. The zinc vein, which will supply the concentrator with ore, has widened out from 4 to 7 ft., showing a large body of good-grade ore.

The King of Lead continues its development work, the lessees having added two additional men to the force; they are still pushing the crosscut tunnel.

The Duluth & Chiricahua Development Co. is continuing work in the shaft and has attained a depth of about 40 ft. This work at present is done with a hand windlass. A steam hoisting plant will be put in soon to sink the shaft to the 200-ft. level before crosscutting.

F. S. Douglas and associates have bought under bond the Wood Cañon group and have bonded and begun work on the Scranlon group on Horace mountain, adjoining the Cochise property. Mr. Scranlon had an adit driven north into the mountain about 100 ft. The new management will continue this tunnel to cut the contact at right angles, probably about 200 ft. further north. The showing on this property is flattering.

Tonopah. Nov. 26.

The Tonopah Banking Corporation is exhibiting a bar of gold and silver weighing 438 oz. and valued at $350, the result of a test run on 20 tons of low-grade ore from the Montana-Tonopah, made at the Reno Reduction Works by the Pohle process.

Developments in the Midway are now concentrated chiefly on the north crosscut on the 435 level, in order to cut the Montana vein system. The east drift on the 365 level is now in shipping ore, only about 65 ft. from the Montana boundary. The fact that the drift in the latter property, which is to connect with the Midway drift, shows 5 ft. of $100 ore close to the boundary adds to the value of the Midway. The company shipped three carloads of ore this week, taken from development work.

Work on the big ledge of the West End is progressing favorably, the high value being well maintained in the face of the drift and in the raise on the vein. High-grade ore is being sacked daily, and a shipment will be made at an early date.

It is reported that a promising strike has been made on a group of claims situated about 3 miles southeast of Ramsey's Wells and about 15 miles south of Tonopah. At a depth of 30 ft. a strong ledge of quartz, which carries good values in gold and silver, with a fair percentage of copper, has been struck. Assays made at Goldfield from samples of the rock indicate that the property is valuable.

One of the most valuable strikes in the Goldfield district has been made recently on the Black Butte claim, owned by the Diamondfield-Black Butte Consolidated Gold Mining Co. The orebody is said to be 14 ft. wide, averaging $80 a ton clear across, though much of it is high-grade shipping ore. The company is a consolidation of the Diamondfield Gold Mining Co. and the Black Butte Gold Mining Co., owning 5 claims in the Diamondfield district, 3 miles northeast of Goldfield. The property includes the Quartzite fraction, a very profitable lease, which was operated by John McKane, who is now president of the present company and the largest individual stockholder.

The new strike on the Bullfrog-Royal is developing well. The pay streak is from 6 to 12 in. wide, and in much of the quartz taken out free gold can plainly be seen with the naked eye. In addition to the rich pay streak, the ledge, which is pure quartz, carries gold and silver in values which make it, as a whole, a shipping proposition. The ledge occurs at the contact of lime and porphyry strata.

There appears little doubt about the Las Vegas-Bullfrog Railway materializing. Orders for ties and rails for 60 miles of track have been placed by the Las Vegas & Tonopah Railway, a related corporation to the Salt Lake road. The route has been selected, and will be 113 miles long, extending from Las Vegas through Corn creek, Indian creek, Miller's Spring, Gold Center, Rhyolite and into Bullfrog. The plans call for the turning over of the line for operation by May 1, 1906, but it is expected that the road may be open before that date. The construction work is all fairly easy, no engineering difficulties being presented. It is the plan of the company to build the road eventually through to Tonopah *via* Goldfield and have that portion completed early in the summer.

A Government geological survey party of nine, R. H. Chapman in charge, aided by B. D. Steward and S. H. Ball, are camped at Gold Center. They are making surveys for the purpose of mapping 9,000 square miles of territory, extending from Tonopah to Johnnie, and from Lone Mountain to Death Valley. The maps will be made on a liberal scale, and will be ready for the public by next spring.

Denver. Nov. 28.

The executors of the Stratton estate have filed their answer to the petition of the Attorney-General to collect $362,844 as State inheritance tax, claiming that the appraiser did not place the right value on the assets, as a number of claims against the estate had not been adjusted, some of them pending in the courts. They request that the petition be dismissed, and also state that they will test the validity of the State inheritance tax law, under which the Attorney-General is trying to collect. In addition to a number of judgments obtained against the Cripple Creek Homestake Mining & Reduction Co., County Treasurer Phipps, of Teller county, has placed a distress warrant for $552 in the hands of the sheriff for back taxes on the property.

In the Federal Court of Appeals, at St. Paul, the Golden Cycle Gold Mining Co., of Cripple Creek, gained a victory over the Theresa Gold Mining Co., when Judge Sanborn sustained the Circuit court of this State in upholding the demurrer interposed by the former company, which was being sued by the other for $250,000 damages and re-possession of certain ground.

For a consideration stated at about $750,000, J. V. Milliken, of St. Louis, has purchased the controlling interest in the Independence Consolidated property, which includes the Hull City placer, from Eben Smith and W. P. Dunham.

During the past few days there was considerable talk in regard to a deal, including the sale of the famous Gold Coin mine at Victor, owned by the Woods Investment Co., to the United States Refining & Reduction Co., the principal stockholders in which already own the Granite property, located a short distance above.

At an early date a meeting will be held to perfect the arrangements for the construction of the second drainage tunnel in the Cripple Creek district, according to the suggestions and plans of D. W. Brunton, whose report was published in this JOURNAL a few weeks ago.

The United States District Attorney is expecting orders in the matter of the Gore Cañon problem every day, and the general expectation is that the proceedings on the part of the Government against the Denver, Northwestern & Pacific railroad will be dismissed, in which case the construction of that road will proceed vigorously until Salt Lake City is reached.

W. J. Gardner, of the forest service, has just completed several months' work in a number of the reserves, among them the Gunnison reserve and the Pike's Peak reserve, in this State. About 175,000 acres of public land in the Roswell land office district in New Mexico has just been withdrawn for forestry purposes.

Official announcement has been made by

President Daniel Guggenheim that the purchase of the Utah Copper Co. has been concluded.

President Hearne, of the Colorado Fuel & Iron Co., has just returned from an inspection tour of the properties of the company and seems to be pleased with existing conditions. The shortage of cars has been the cause of a smaller output of coal than would have otherwise been the case, but this situation is being relieved.

Leadville. Nov. 24.

The steady advance in the price of silver has materially increased the prosperity of Leadville, as all of the iron-silver bearing claims are now in a position to send the ore to the smelters. An advance of 10 points on a 5-oz. ore in silver bullion, about the lowest grade there is, means a rise in price of 50c. a ton for the crude ore; in low-grade ore the advance of 50c. a ton means the difference between profit and loss. Some of the mine managers state that if the price reaches 75c. the wages of the men will be advanced. At the present price of silver it means the employment of more men, and therefore an increased tonnage. The advance in the price of silver has been what was lacking to put several properties on a paying basis. Another fact that adds to the prosperity of the camp is that the smelters will pay the miners from 10 to 17c. per unit more for lead from now on. This means that for ore carrying 6% lead the owner will receive 30c. per unit, instead of 25c. before the price was raised.

The Maguire tunnel, which is located 200 ft. south of the Continental Chief, Iowa gulch, has reached a distance of 200 ft., and preparations have been completed to keep at work all winter. McGuire is certain that he is on the trend of the Continental Chief ore-shoot, and that he will not have to drive much further before the vein is cut. Ore is now being shipped from this shoot in the Continental Chief that runs 1,100 oz. silver per ton. This property will also continue at work all winter. Further down Iowa gulch a good body of lead carbonate has been opened in the North Star, and shipments will go out this week. On the north side of the gulch, opposite the North Star, McGinnis & McClellan have opened in their shaft a vein of good carbonate ore; the shaft is down 100 ft. Small shipments are being sent out from the Ready Cash, the ore running fairly well in gold.

A good body of lead ore has been opened in the old Sequin shaft, Rock hill, and shipments were started this week. The property is to the north of the Reindeer.

A heavy flow of water was encountered at 530 ft. in the Mammoth shaft, Big Evans gulch, demanding heavier pumps, which are now being installed, a station being cut at 520 ft. The drill-hole showed a body of sulphide ore at 600 ft., so it is more than probable that this body will be cut shortly after sinking is resumed.

The David Harum Mining Co. owns 45 acres of ground east of the Long and Derry, on the hill of that name, and has already sunk five prospect shafts on different parts of the territory; the work will now be consolidated, and a main shaft sunk to the lower contact.

A good body of ore has been opened in the lower level of the Big Six, Breece hill. Shipments will be sent out this week and the strike thoroughly developed.

Butte. Nov. 22.

With the exception of one claim, all of the mining ground which Joseph A. Coram, of Boston, and other capitalists intend to put into a new corporation has been acquired and some details concerning the proposed company given out. The company is to have a capitalization of $50,000,000, and is to include the property of the Mexico Consolidated Mining & Smelting Co., the Balakalala copper property in California, the property of the Montana Coal & Coke Co. and about 20 mining claims in Butte. These claims include those owned by the estate of A. J. Davis—the Thomas, Carrie, Smokehouse, Hesperus, Plymouth, Destroying Angel, Baltic, Red Chief, Lizzie, Colorado, Yellow Jack, Maxmilian and several fractions owned by the Hearst estate. Mr. Coram and L. H. DeFriese started east last week with the intention of rounding out the company in Boston, leaving Charles H. Palmer here to continue negotiations for the purchase of the Silver King, a desirable silver-gold producer. It is understood that the company is to be a holding one, and that the Butte end will be represented by a capitalization of $15,000,000, of which $5,000,000 will be in cash and $10,000,000 stock. Duncan McVichie, who has charge of the property of the Bingham Consolidated in Utah, has been selected to manage mining operations in this city. It is the intention of the company to build a smelting plant near Butte, for it estimates the output of its mines at 4,000 tons a day after the claims are properly opened. Mr. Coram and associates have been working on the deal about three months.

The East Butte Copper Co. has begun to boom its possessions, which consist of 9 fractional copper-silver producers in the southeastern part of the city. It owns some of the property, and has options on the remainder. Some of these claims are yielding good ore. The veins, however, are not large with present development. They have been explored to a depth of 300 ft. The Dutton mine, owned by the Butte Mining & Smelting Co., is the most promising of the group. The East Butte has an option on 590,000 shares of its stock, leaving 10,000 among small holders.

Amalgamated is preparing to develop the J. I. C. mine, in the eastern part of the city, and is also sinking a shaft on the Greenleaf, with a view of prospecting the ground. The Greenleaf is in the center of about 200 acres of mineral land, which the Boston & Montana owns on the mountain side, about a mile east of its Butte property. The J. I. C. is an old producer, but has not been worked by the company for several years. It has been under lease.

United Copper has resumed work in the north crosscut of its Belmont mine, and is sinking a winze near the face of the opening. It is still stoping some low-grade ore from a vein struck 300 ft. north of the shaft. The company has drifted 2,000 ft. in one direction and 2,200 ft. in another on one vein without finding pay ore. It is extracting some good ore from its Lexington mine, and will soon be in shape to increase the output of that property. The Rarus, Minnie Healey and Cora are yielding their customary quantity of good ore, they being the main source of supply.

North Butte expects to finish the retimbering of its shaft in about two weeks, and be in position then to receive its new Nordburg hoisting engine, which is to be delivered about December 1.

Salt Lake City. Nov. 16.

The Boston Consolidated management has commenced the construction of an experimental mill on its property at Bingham. The plant was designed by A. J. Bettles, chief metallurgist, and will go into commission about Jan. 1 next. The plant will be equipped with a battery of five stamps, each weighing 1,250 lb., and the concentrating devices will include two Wilfley and one Johnson table, also two Frue vanners. All this equipment has been ordered and will be on the ground by the end of next week. With this mill ore from all the various tunnels and workings in the mine will be sampled and tested. Upon results obtained will depend what the proposed large plant will be.

The Inyo Gold Mining Co. has been organized at Provo, Utah, with a capital of 1,000,000 shares, par value $1, to operate in the Echo mining district, Inyo county, California. L. Holbrook is president, and John R. Twelves, secretary and treasurer. Both are prominent Provo mining men.

The Intermountain Power Co., a carporation composed of local and Eastern capitalists, has commenced the construction of a large electric power plant in Little Cottonwood cañon. It is proposed to supply power to Salt Lake and Summit counties mining camps. James J. Chambers, Atlas block, Salt Lake, is manager.

The Latham lead mine, located in the Deep Creek mining district, according to Manager Geo. L. Moats, of Salt Lake, is soon to be equipped with a lead stack.

The property is owned by the Ohio Lead Mining & Smelting Co.

The American Smelters Securities Co. has decided not to exercise its option on the entire capital stock of the Ohio Copper Co. at Bingham for $750,000. Immediately following the announcement, overtures for the property were made by Samuel Newhouse, who is believed to have been given a call on it.

At Pioche, Nevada, the Nevada-Utah Mines & Smelters Co., of which Col. John Weir, of New York, is at the head, is getting ready for a big campaign at the properties acquired by that concern. No. 5 and Phoenix shafts at the Old Meadow Valley mine are being re-timbered. A contract has been let for 3,000 ft. of railroad grade as well as for the equipment. The Nevada-Utah corporation proposes to smelt its own ores and not depend on custom plants.

The flooded mineral zone of Park City is being rapidly drained by the re-opening of the Ontario drain tunnel. It is yet too early to estimate the damage done to the Ontario and Daly mine workings, which have been under water since last March.

The new equipment recently installed at the Annie Laurie mill at Kimberly, consisting of crushers and dryers, is in commission. The plant can now handle 300 tons of ore per day.

Spokane. Nov. 23.

The Spokane country is singularly blessed with building stones and with structural clays. A fine quality of granite is quarried at the outskirts of the city, and new deposits are being opened. There is also a basaltic overflow covering most of eastern Washington, and it is largely used for stone trimmings and for rustic work in residences. The supply of clays hereabouts is large. The Washington Brick, Lime & Manufacturing Co. is shipping various colored brick and terra cottas all over the Pacific coast. The most popular brick here is a very light cream-colored re-pressed brick, and it gives the business portion of the city a singularly clean and fresh appearance, which is strengthened by the absence of smoke in the atmosphere, for electricity, derived from the falls, is used exclusively for power.

The marbles found just north of Spokane are steadily reaching a larger market, and the Fred. Sammis Marble Co. is shipping all of the finished wainscoting it can produce. Magnificant white- and blue-mottled marbles are being quarried around Colville. The Pacific Portland Cement Co., having large deposits of clay and lime on the Pend d' Oreille river, near Newport, Wash., is planning an extension of its plant so as to make portland cement as well as hydraulic cement.

The mining camp of Twisp, Wash., in the Okanogan country, is excited over the report that F. Augustus Heinze, of Butte, has bonded the Alder group of four claims for $1,250,000. The property, of which little was heard until this fall, has a large deposit of copper. The property, which is owned by Fargo, N. D., people, has been developed only by the expenditure of $20,000. The report that Mr. Heinze has bonded the property is denied by Mayor John Maginnis, of Butte, who is vice-president of Heinze's United Copper Company.

Duluth. Nov. 24.

Messrs. Miller, Hawkins & Kinney have sold their lease of an 80-acre tract in sections 5 and 6, T 57 20, for $325,000. The tract contains about 4,500,000 tons of 56 and 57% non-bessemer ore, and carries a 25c. royalty above the sale price. The shortsightedness of many iron men is well shown in this transaction. A year or more ago, when there was a temporary decline in ore values and the market was under check, this and better properties were freely offered at Cleveland for $100,000 and less, and there were no takers. The mine will probably be opened the coming year.

The Drake & Stratton Co. will strip the old Commodore mine, at Virginia, Mesabi range, and has a shovel on the ground.

Most of the stripping contractors will keep at work as far into winter as possible, and the probability is that many of them will be busy removing dirt all through the cold weather, contrary to precedent. Stripping will continue at the Hull-Rusk, the Morris, the Commodore, and other mines all winter.

The new St. Paul mine will be opened this winter. Corrigan, McKinney & Co. are now planning to erect 12 dwellings for men.

LaBelle Iron Works Co. owns the lease of the Miller mine, on the East Mesabi, which has been shipping this season and is now stocking for next year, and that of the Petit, which has also ceased shipping for the season. It has also a small amount of undeveloped ore lands on the range, all of which may be sold shortly.

A shaft is being sunk on the Mud creek lands under lease to the Oliver Iron Mining Co., on the Vermilion range, and the formation will be thoroughly explored at once. There is great interest in this range at present, and the number of explorations under way there is in excess of anything since the range was opened. A number of drills and test-pit crews are working near the town line between 62—13 and 14, around Robinson lake, and the indications are said to be excellent.

The present appearances are that the iron-ore shipments, 1905, from the upper lakes would amount to 34,000,000 gross tons, rather than the figures that have been accepted heretofore, providing weather conditions remain favorable for two weeks. The exceedingly warm and pleasant weather of November has made a great difference in shipments, and it seems probable that the three roads covering the Mesabi and Vermilion ranges would roll up a total not less than 22,000,000 tons. The Duluth, Missabe & Northern, one of the Steel Corporation's lines, has passed 750,000 tons for November and is sure to make better than 1,000,000 tons for the month, which is far above any November record for any one road on the lakes.

The actual work of construction for the 72-ft. ore pier of the Duluth, South Shore & Atlantic road at Marquette has begun, and 5,000 piles are to be driven at once. About 6,000,000 ft. of Pacific coast timber is to be used in the dock construction. M. J. Peppard, of Minneapolis, has the contract. The contract for the $1,000,000 ore pier of the Duluth, Missabe & Northern road, at Duluth, has been let to Barnett & Record, and they will begin work at once. It will be well into next winter before it is completed. The contract is for about $700,000 and the road will do the rest. The American Bridge Co. has been given contracts for the steel erection for approaches, etc. In this pier 12,000,000 ft. of timber, mostly pine, but with a large amount of maple, will be required. It will be the largest dock in the world, and will give the company capacity for more than 225,000 tons storage. The Milwaukee road's dock at Escanaba is getting along, and a large part of the pile foundation has been driven. Timber for the superstructure is on hand. The changes in the Northwestern ore pier at Ashland have not been commenced, but will be after the close of navigation, and are to be completed before the opening of next season. They amount to practically a reconstruction of the large dock.

On the Menominee range the drill explorations at old Saginaw mine, under way by Longyear & Hodge, are showing good ore for a considerable depth, and are still in ore. It is a bessemer grade and looks like a large deposit. Nanaimo mine is shipping this year about 100,000 tons, which, for a property that was thought of no value, is pretty good. Old Breen mine, which has been pumped out, is now being developed by a large force. Bristol mine is increasing its product this year to 300,000 tons, which is 70,000 above 1904. At Ludington C shaft, of the Chapin mine, they are now down 1,250 ft., after a trifle more than two years' work. The excavation for the foundation of the great Cornish pump, which is to be utilized at that shaft, is about completed, and the work of erecting steel buildings and steel shafthouses will be carried out in the spring.

Cole & McDonald, Duluth diamond-drill operators, now have about 50 drills running in the Lake Superior region. This is an indication of the activity in the exploration field at present. Of these drills several are employed on the Vermilion range, near Tower, several on the new Deerwood district, west of Duluth, several

at Baraboo, the rest at Negaunee, Crystal Falls, Amasa, Quinnessec and Iron River, all Menominee points, and two close to Houghton. Other drill-men are very busy, and there are understood to be more than 200 diamond and churn drills now at work in the Lake Superior country, for iron alone.

Platteville, Wis. Nov. 27.

Considerable prospecting work is being carried on at the Scales Mound camp, just south of the Wisconsin State line. The old Frontier mine has been taken over by several employees of the Illinois Central railroad, and they report a showing of good lead. At the Ritweiger diggings, the owners are installing suitable machinery to raise the water, which hitherto has been a problem. The Veta Grande machinery was bought in by the former employees, who it is reported will continue the work. The men have great faith in the property, the last shots having broken into a lead opening of great richness. Scales Mound camp yields principally lead.

The new concentrating plant at the Skene mine, in the Elizabeth camp, started up Monday; the jigs were bedded in a few hours, owing to the extreme richness of the ores. The plant is the most modern in the district, having a central electrical plant, from which power is distributed to the different pumping and hoisting shafts.

It is the intention to furnish the Black Hawk mine, owned by the same company, some three miles from the Skene, with electrical power. A point of interest connected with this district, is the fact that nearly all of the mines lying to the south of the State line, produce lead, while those farther north yield nearly all zinc.

The Lucky Hit mine recently broke into a very good vein of zinc ore, carrying less sulphur than the ore previously mined. The owners are experimenting with a roaster embodying all the important features of the different types of roasting kilns, patents upon which have expired, together with some new ideas. Mining men are watching the results closely, as the ore at the Lucky Hit carries nearly 25% sulphur.

The number of new strikes reported is gratifying to those interested in the district. The indications are that there will be in the neighborhood of 25 new properties ready for mills the coming spring. There are now 36 concentrating plants and 12 roasting and separating plants in operation in the district. In course of erection there are 10 concentrating plants and 7 roasting and magnetic separating plants. The production for the last six months has equaled that of the twelve months previous.

The Buncombe camp, at Hazel Green, Wis., leads in point of tonnage, with Platteville second, Mifflin and Linden close behind.

The Grunow mine, in Mifflin camp, keeps the haulers busy, taking the ore to the smelter at Mineral Point.

The Sunrise mine, in the Rewey camp, adjacent to the Mifflin camp, in sinking the new inclined shaft, broke into a 2-ft. vein of zinc and lead. This mine has been a steady producer for some time, and its output will be doubled as soon as the new territory is properly developed.

The Dawson Mining Co. has placed a contract for a 50-ton concentrating plant, with the Galena Iron Works Co. It is expected to have it in operation early next spring.

The Exploration Syndicate, which has been doing considerable work in the vicinity of Strawbridge camp, has been rewarded by a rich strike in the main shaft.

The Walker lease, near Elmo camp, was secured by Pittsburg capitalists, who intend to put drills at work as soon as they can be secured. There is a good showing of zinc and lead already in sight.

The new Wicklow mill started to clean ore this week; from every indication the output will average one ton per hour. It is the intention to pile up the ore and hold it for treatment on the new separating plant, which will be completed early next month.

Indianapolis. Nov. 26.

Perhaps no industry has made more substantial progress in Indiana during the last few years than mining. The lively demand for coal mines and coal lands in this State has steadily continued; the last sales reported were 600 acres near Winslow to Col. Charles Nox and associates, representing a Chicago syndicate of coal mine operators. The consideration was $148,000. The lands are to be developed at once.

The McPherson Bros., of St. Louis, have expressed their faith in Indiana coal lands by their recent purchase of a 500-acre tract of Pike county coal land.

Coal lands, including several mines near Fort Branch, in Gibson county, have been transferred to a company of Chicago capitalists. The sale price was $20,000. The new company proposes to expend $30,000 in improvements and employ 500 men.

The prospect of the Chicago, Indianapolis & Evansville railway going through Pike, Warrick and other coal-producing counties has caused unusual activity in these counties, and the coal lands are being developed rapidly.

Two large coal-mining companies to operate in the Indiana fields, were incorporated during the past week. The American Coal Mining Co., capitalized at $150,000, will have a central office in Indianapolis. The directors are Charles P. McCaffrey, Albert D. Scott, Wm. C. Shoemaker and Charles T. Trobridge.

The Peabody-Alwart Coal Mining Co. will have a capital stock of $100,000, and will likewise maintain a central office in Indianapolis. The directorate is composed of A. W. Underwood, Nathan Smyser, J. A. McKeon and Robert J. Devine.

H. B. Tormohlen, while sinking a well on his farm near Holland, in Dubois county, at a depth of 30 ft. struck a ledge of sandstone, underneath which is a 4-ft. vein of coal of excellent quality. There is much rejoicing over the find.

The Daviess County Coal Co., operating near Montgomery, announces that the company will soon sink shaft No. 4. The company's coal is of such a superior quality that the railroad company takes about all that can be produced.

A shortage in the supply of domestic coal is threatened in many portions of Indiana at the opening of the winter season. The situation throughout the Indiana coalfields is somewhat serious, owing to the shortage of cars. Promises of relief have not been fulfilled, and the Indiana operators are experiencing great trouble in getting their coal away from the mines. Manufacturers are short of fuel, and begin to see the necessity of shutting down unless cars are furnished in a short time. Throughout the mining districts the mines are being operated on an average of less than four days a week. Prices are increasing, and the consumer does not like the looks of things.

With the approach of the miners' national convention, to be held in this city in January, the interests begin to show signs of unrest. That the miners' leaders do not intend to sign contracts for the Interstate bituminous field if no agreement has been reached with the anthracite operators, is practically assured.

Scranton. Nov. 27.

Another individual coal company has joined the majority, the Black Diamond colliery, at Simpson, having been purchased by the Scranton Coal Co., a subsidiary company of the Ontario & Western railroad. The controlling interest was held by W. G. Thomas, of Pittston, who developed the property after it had been reported to have been worked out. New methods were brought to bear in the mining operations and in a few years the colliery became a valuable property. The Scranton Coal Co. took possession on Nov. 25.

Reports are current in the anthracite region that the Central Railroad Co. of New Jersey has made a formal offer for the Lehigh Coal & Navigation Co. stock and that the sale would be consummated before Dec. 15.

Some remarkable shipments were made during the past week by the Reading Co. On Saturday and Sunday it hauled on he Reading and Harrisburg divisions, 29,086 cars of coal and freight. In order to accomplish this, every available locomotive,

passenger and freight, was pressed into service on Sunday. Owing to the great demand for anthracite the Reading was short of 7,500 cars, all of which were on foreign roads. For this reason orders have been given not to load any more cars to points beyond the company's lines, until its own equipment, or a large portion of it is returned.

The first shipment of coal was taken from the Blackwood colliery, of the Lehigh Valley Coal Co., last week. It has been rehabilitated at great expense, and is now one of the best equipped in the region. The breaker is run by electrical power, while electrical haulage is employed in the mines, as well as outside, wherever feasible. The shaft has been sunk several hundred feet in order to connect with the old tunnel, and the mine cars are hoisted from the tunnel to a level with the breaker tipple, whence they travel automatically over an inclined railway to the breaker, returning to the shaft in the same manner, when unloaded. The company also has a machine shop, car shop and blacksmith's shop, thoroughly equipped, which are all furnished with electrical power. The colliery was abandoned 10 years ago, owing to the problem of dealing with the water. This has now been overcome by extending the old tunnel through Sharp mountain to Black Creek, where an immense storage reservoir is being built. Five hundred men and boys are already employed, while this number will be considerably increased.

The Lehigh Valley Coal Co. has purchased a tract of coal land, 470 acres in extent, in Branch and Reilly townships, near Pottsville, from H. S. Gray, of Logan, W. Va.; it is situated near Blackwood colliery.

The breaker at the old Maffet colliery, Sugar Notch, which has been in operation for 24 years, is to be replaced by a new structure.

The Lehigh Valley Co. has canceled an order placed with a Pittsburg firm by the Coxe Co., for a large consignment of steel cars.

An order has been issued by the Reading company that the foremen and minor officials must reside near the collieries at which they are employed. With that view houses are being built near the mines.

A large steam plant is being built at the Thomason colliery in order to remove the water from the old slope.

The Central Railroad of New Jersey has awarded a contract to C. R. Kinsley, of Scranton, for the building of a branch road, four miles in length, to extend its tracks from Truesdale city to the West End Coal Co.'s colliery at Mocanaqua, and there connect with its own tracks that extend across the river bridge to Shickshinny. It will then be able to ship the coal from the Mocanaqua colliery over its own line.

William Siley, of Wilkes-Barre, has been promoted to be superintendent of the Lehigh Valley Coal Co.'s collieries in the West Side district of the Wyoming division, and Evan C. Price has been appointed inside superintendent of collieries in the Eastern district.

The employees in the Coxe collieries, recently acquired by the Lehigh Valley Co,. are paid a lower rate of wages than those in the Lehigh collieries, and have made a demand that their wages be placed on a uniform standard. Owing to the policy of retrenchment, since the Lehigh Valley Co. purchased these colliries, the reduction in salaries and the abolition of superfluous positions has resulted in the saving of $7,800 per month. It is expected that the official payroll will be reduced by $11,000 per month by January.

Quite a sensation was sprung during the week in connection with the exposé of the manner in which some of the miners' examining boards in the anthracite region grant certificates of competency to would-be miners. The law requires that a man must first work in the anthracite mines as a laborer for two years before he can pass examination for a miner's certificate, and then must prove his competency. One John Deforock was working in the Beaver Meadow mine as a miner, and in four weeks had loaded only three cars of coal. The superintendent investigated the matter and found that Deforock was densely ignorant of all rules of mining, could not speak English and had been in the country but 10 months. The board was charged with having granted him a certificate illegally and the three members admitted that they had asked no questions, that Deforock had not been sworn, no one had vouched for him, that he had simply paid his dollar and had been given the certificate stating that he was a competent miner. It is probable that steps will be taken to punish the board.

At the last meeting of the Conciliation Board in Wilkes-Barre an innovation was made in referring one of the grievances in which the Delaware & Hudson Co. was interested, to two of the members, Messrs. Cornell and Nichols, for the purpose of effecting an amicable settlement, so that the case would not have to be brought before the six members of the board. It is believed that future work will be carried out along these lines, thus saving much time and traveling for the conciliators.

The outside laborers in the collieries in the Hazelton district claim that they are paid 20% less than men engaged in similar work in other sections of the region, receiving only $1.25 per day. They will make a special demand at the Shamokin convention.

A bore-hole 350 ft. deep has been driven from the surface to the Red Ash vein of the Nottingham colliery, near Wilkes-Barre, for the purpose of conveying steam to operate the pumps in the mine workings.

On Saturday the newspapers in the anthracite region were considerably exercised over a story which was sent out from Pittsburg, purporting to be an interview with John Mitchell, in which he was said to have predicted a strike of 500,000 miners in the anthracite and bituminous regions in April next. Knowing that Mr. Mitchell's views expressed quite recently were very different, a number of the papers refused to print the story, and wired Mr. Mitchell as to its authenticity. A reply was received from him that there was no foundation for the statement, that he had given no such interview, and that the only declarations he had expressed were contained in his public addresses.

The new Harry A. breaker, of the Temple Iron Co., at Swoyersville, will be completed within a month. It will replace the old breaker, which has been condemned, will have a daily capacity of 2,000 tons, and will be equipped with electrical slate pickers. The Temple Co. is also installing improvements at the Lackawanna colliery, at Olyphant, where a new air shaft is being sunk to the Dunmore vein. The new main shaft at this colliery was completed a few days ago. A new shaft is also being sunk at the Sterrick Creek colliery, in the same neighborhood, where the breaker is being partially rebuilt. Electrical haulage is to be installed in the mine, so that the colliery will be practically a new one in the course of a few months. In the Mt. Lookout colliery, a slope is being driven from the Marcy to the Red Ash veins. A new boiler plant, with Maxim boilers, is being installed in the Lackawanna colliery, and will have an aggregate of 2,150 h.p. This will furnish steam for electrical power, as well as other machinery.

The Kingston Coal Co., Wilkes-Barre, announces that it has completed arrangements to flush culm into the old workings under the cemetery, which was threatened by subsidence.

The new Audenried breaker, of the Lehigh & Wilkes-Barre Coal Co., began operations on Monday. It has been under construction for the past 12 months, and replaces the old breaker which was destroyed by fire. Employment will be given to 800 men and boys at the colliery. It will have a capacity of 2,000 tons, and has one unusual feature, a paving of vitrified brick underneath, being the second of the kind in the anthracite region, the other being in Plymouth. It contains the latest improved machinery, having 26 jigs, 18 shakers, 5 sets of rollers for the various sizes of coal, 5 screens, 5 pairs of scraper lines, and 2 pairs of elevators.

The fire in the Enterprise mine, which has been raging for the past 12 months, is now extinguished. It is estimated that coal valued at $100,000 has been consumed.

A remarkable innovation was made by the miners employed at the Pancoast colliery of the Scranton Coal Co. last week, when resolutions were unanimously adopted declaring against the suspension of work for the purpose of attending the funeral of fellow-workers, and deciding to work on such days, and to donate one-fourth of their earnings on that day to the family of the deceased. The passage of such resolutions heralds the dawn of the millenium in the anthracite fields. For many years it has been the custom of the miners to suspend work on each day that a fellow workmen is to be buried, thus causing serious loss to the company, as well as to the men themselves. In some instances the men were compelled to attend the funeral or pay a heavy fine. The custom had grown to the extent of being a nuisance.

Victoria, B. C. Nov. 20.

The field work of the zinc commission, appointed by the Canadian government, with W. R. Ingalls, of New York, at its head, has been completed for this year. From Mr. Ingalls, who recently visited British Columbia, it has been ascertained that the purpose of the commission is to promote the zinc-mining industry of British Columbia. Under the direction of Dr. Haanel, Dominion Superintendent of Mines, the aim has been to make a thorough, scientific investigation of the ore deposits, the character of the ores, and the best methods of putting them in marketable form, together with the prospects of establishing metallurgical treatment in the province. The subject of zinc ores with high silver content is to receive special consideration. The field work was placed in the charge of Philip Argall, of Denver, Colo., who was assisted by A. C. Garde, of Nelson. Mr. Argall was especially commissioned to examine the producing and developed mines. Dr. A. E. Barlow, of the Dominion Geological Survey, was subsequently detailed to investigate the prospects and undeveloped occurrences of zinc ore. He was assisted by Joseph Keele, also of the Survey. Mr. Argall began his work in the field about Sept. 1 and completed it about Nov. 15. Most of his time was spent in West Kootenay district. He also examined the chief silver-lead-zinc mines of East Kootenay. At the same time Dr. Barlow visited properties on the coast and adjacent islands, and later on certain others in the Boundary district. Mr. Ingalls spent the latter part of October and the early part of November in the field going over the ground that had been covered in detail by Mr. Argall. The work in the field was designed to establish the conditions under which zinc ore occurs; the conditions of mining, milling and transportation, and the character of the various ores that are or can be, produced. This work has been preliminary to experiment upon methods of ore-treatment, which is to be conducted at Denver during the ensuing winter, and numerous large samples of ore have been sent to Denver for that purpose. The experiments will be made under the general direction of Mr. Ingalls, and the immediate supervision of Mr. Argall and Henry E. Wood. It is intended to determine by these experiments the most efficient method for the treatment of the British Columbia zinc ores. Various types of magnetic and electrostatic separators will be tested, and plans and specifications for carrying out the recommendations of the commission will afterward be prepared. The report of the commission will be published at the earliest possible date. Dr. Haanel thoroughly appreciates the value of prompt information, so has given instructions that no effort be spared to consummate the work as rapidly as is consistent with thoroughness.

Although a bill providing for a compulsory eight-hour day in the smelters of British Columbia was defeated at the last session of the provincial legislature, it was recognized by smelter owners that they would have to arrange for shorter hours for those of their employees who were on 12-hour shifts. Accordingly the Canadian Smelting Works, at Trail, a few weeks ago, arranged for eight-hour shifts for all its men previously working 12 hours. Next the Hall Mining & Smelting Co., Nelson, announced its arrangements in a similar direction. Now the Granby Consolidated Co., operating the largest copper smelter in Canada, with works at Grand Forks, B. C., has come to an understanding with its men on this question. The final agreement, the result of negotiation between the local management and the men, is to the effect that there will be three shifts of eight hours each, and that all smelter employees receiving more than $2.50 per day, the amount paid laborers, shall submit to a reduction of 10% in wages. Mechanics who have been working 10-hour shifts will continue to do so, except on Saturdays, when eight hours will constitute their day's work. Other smelters in the province will, no doubt, come to somewhat similar agreements with their employees, and what was at one time regarded as likely to result in labor difficulties will thus have been amicably settled.

The Britannia Co. is making an exchange of silicious ore from its big mine on Howe Sound for irony-copper ore from the Alaska Smelting & Refining Co.'s mines on Prince of Wales Island, Ketchikan district, southeast Alaska. This exchange will be of mutual benefit to the two companies concerned, the Britannia Co. having an abundance of copper ore running high in silica, while the Alaska Co.'s ore has iron to a greater extent than is favorable for advantageous smelting without the admixture of silica secured by the above-mentioned arrangement. The latter company's smelter, at Hadley, Prince of Wales Island, is now at work, the 500-ton blast-furnace having been blown in a week or two ago.

Ymir.—During October smelter returns were received from 109.5 tons of ore from the Arlington mine, at Erie, owned by the Hastings (British Columbia) Exploration Syndicate, Limited.

London. Nov. 18.

A few weeks ago I referred briefly to the results at Stratton's Independence mine for the year ended June 30. Since then the complete report for that period has been issued, and many additional items of interest are contained in it. The total quantity of ore shipped during the year by the lessees was just under 50,000 tons, and it realized £408,000, gross, or, after deducting freight and cost of treatment, £318,000, net. Of this sum, £213,000 went to the lessees, and £105,000 to the English company. A small amount of ore was also raised by the company itself, realizing £8,800, and the company also made profits out of its stores, amounting to £9,000. After paying all administration expenses in Colorado and London, the net profit made by the company during the twelve months was £94,246. Out of this, three dividends, amounting to £75,000, have been distributed. The undivided balance on June 30 was £63,000, and the income from the sale of lessees' ores has continued steady, so that since then two further dividends, absorbing £50,000, have been declared. It is interesting to note that the total dividends paid to shareholders since the inauguration of the company now amounts to £954,173, or nearly equal to the issued capital of £1,000,000. Of these dividends, £550,000 were paid during the early days of the company—during the years 1899 and 1900—and the remainder during the last five years. In the directors' report, it is definitely stated that Godfrey Doveton is of opinion that the Cassel process can be profitably used on the company low-grade ores—$3 per ton and upward.

The report of the Consolidated Gold Felds, of South Africa, for the year ended June 30 last, shows a gross profit of £370,000, out of which debenture interest, preference dividend and a dividend on the ordinary shares, at the rate of 15%, have been paid. During the previous twelve months the ordinary dividend was 12½%. From the middle of 1898 to the year 1903-1904, no dividend was paid, except in 1901-1902, owing to the war and the general depression in the mining market. The report for the year contains a large amount of interesting information relating to Chinese labor and the introduction of tube mills. The Chinese coolies appear to be doing better work than the Kaffir laborer, and as drill men do more inches a day than the Kaffir.

General Mining News.

Western Coal Operators' Meeting.—At the meeting held in Chicago, Nov. 22, pursuant to call, 85 delegates were present. Illinois, Indiana, Ohio, Michigan, Kansas, West Virginia, Missouri, Iowa, Arkansas, Pennsylvania, and Indian Territory were represented. The Pittsburg district and the Hocking Valley were not represented; and the West Virginia delegates did not promise that the operators of that State would agree to the action of the meeting. The object was to form an organization which will have power to deal with the miners when the question of a new agreement comes up early next year. A resolution was passed creating the commissioners and secretaries of the various districts into a committee to draw up plans for a permanent organization of the National Bituminous Coal Operators. W. C. Perry, of Kansas, was chairman of the meeting, and C. L. Scroggs, of Springfield, Ill., was secretary. While the meeting was not intended to be public, it is understood that several questions were discussed, but without final agreement.

ALASKA.

It is reported in Sitka that the gold deposits on Chichagoff island are giving promise of great richness. The gold occurs in the veins as a telluride. A large area of the island has been staked out by Sitka business men. The island will be thoroughly prospected next summer.

CALIFORNIA.

AMADOR COUNTY.

Water Shortage.—Only two of the big mines—the Kennedy and Zeila, at Jackson—are now working, the others having been closed down for lack of water for power. The shortage of water is very serious this year, causing nearly all the mines to close down.

BUTTE COUNTY.

Rich Bar.—This old mine, in Butte creek, has been leased to Los Angeles men, who will develop it, with a view to purchase. It is a drifting proposition, and is near the town of John Adams.

CALAVERAS COUNTY.

Lightner Mining Co.—The insurance adjusters have figured the loss by the recent fire in this mine at Angels at $69,800, and have paid $20,500 as insurance. While there are but few men working in the mine itself, a large force is rebuilding the mill, hoist, etc.

Quartz and Placer Ground Bonded.—The four quartz claims and 60 acres of placer ground on Six Mile creek, near Murphy, have been bonded by Shepperd Bros. and W. N. Garland to Thomas Wells, of Stockton. Development work has been going on for some time.

EL DORADO COUNTY.

Rio Vista Copper Mines.—This mine has closed down temporarily, the water in the river being so low that power is deficient. Arrangements are to be made for reducing the ore before further work is done.

Larkin Mining Co.—Work on this mine, near Placerville, has been suspended by the San Francisco men who were operating it under bond. The material mined was sulphide ore, sold to acid manufacturers. The quality was all right, but the orebody is small.

Lone Star.—This gravel mine, near Smith Flat, is about to be reopened by an Eastern company, with Wm. Rupeley as superintendent. A new incline, 400 to 500 ft. deep, is to be sunk east of the old works, and hoisting works, mill, etc., are to be built. The old channel under the lava will now be worked.

El Dorado Copper Co.—On this property, Georgetown, W. E. Everson, manager, two boilers have been installed at the hoist building, and everything is now ready to start work again. The company has a productive asbestos deposit on its mineral ground, as well as copper ore.

Gravel Mines.—Two gravel mines are being opened east of Placerville, near Blakely's ranch. At the Rondout mine of Richards & Fairchild, good gravel has been found 4 ft. above the new 600-ft. level.

INYO COUNTY.

Terry Mining Co.—This company, 5 miles south of Ballarat, M. J. Terry, manager, has a force of 20 men at work.

Republican.—At this mine, Ballarat, where 20 men are employed, a new mill is to be installed.

Strike.—Messrs. Sanford & Merton, two young men, have made a rich strike in the Panamint range, 15 miles south of Ballarat. Some of the ore assays up very high.

Lone Pine.—At this camp, James Jacoby is running a tunnel on the Meysan claim, and has also let a contract for a 600-ft. tunnel on the Jimmy Sharp mine.

MONO COUNTY.

Golconda.—This mine, Mono lake district, where a rich strike was recently made, has been bonded to J. Sanderson Smith, representing Eastern men.

Crystal Lake Mining Co.—There are prospects that this mine, at Lundy, will be worked on a larger scale than heretofore. Silverton, Colo., men have acquired controlling interests.

NEVADA COUNTY.

Sierra Madre Exploration Co.—A tunnel has been started on the Marcotte group of this company above Washington. Bids are out for 1,000 ft. of tunnel on the Maryland claim also.

Water Restriction.—The manager of the South Yuba and Bay Counties Power companies has issued an order restricting the water power of the mines of Grass Valley and Nevada City to a pump head only. Those using electric power will be allowed to operate their mills during daytime only. All this by reason of an unusual scarcity of water. Some 600 miners are already out of employment.

Spanish Ridge.—For this mine, Washington, J. H. English, superintendent, a new compressor has been ordered, and the water supply is to be increased by securing 400 in. more from the McCarthy ditch. As the mill is expected to turn out two tons of sulphurets daily, a sulphuret house, for storing the sulphurets in winter months, is being built.

SAN DIEGO COUNTY.

Consolidation.—The San Diego Gem Co. and the American Consolidated Hyacinth Mining Co. have consolidated under the name of the San Diego Gem Co. The company owns six mines at Dos Cabezas, formerly known as the Wm. T. Hills mines.

SACRAMENTO COUNTY.

Gray Wing Mining Co.—The men have completed their prospecting operations with the Keystone drills on this property, in Blue Ravine, above Folsom. They have not yet decided whether or not to build a dredge.

Blue Ravine Mine.—It is stated that good gravel has been struck in this old mine, at Blue Ravine, near Folsom. This success may lead other mines to reopen.

Sacramento & Rescue Mining Co.—The tunnel to drain the old works of this property, near Folsom, is now in 1,200 ft., and has but 200 ft. to run. The mine has been closed for over a year, because there was too much water for the pumps to handle economically.

SHASTA COUNTY.

Great Western Gold Co.—This company is now installing a 250-ton blast-furnace as an addition to its former plant. It is also putting in a zinc-ore plant of 150 tons capacity. The work is under the direction of S. E. Bretherton, general superintendent for the company.

SISKIYOU COUNTY.

Garvey Bar.—At this mine, on the Klamath, at the mouth of Humbug creek, owned by John Garvey, some very rich ground is being opened up by drifting.

Blue Gravel.—This mine, in Greenhorn, is to be reopened this month by the Seattle men who recently purchased the ground.

Jilson.—It is understood that at this mine, Hornbrook, a cyanide plant is about to be installed.

TUOLUMNE COUNTY.

Cosmopolite Mining Co.—Machinery for the mill is being put in place as fast as possible, and the ore ready for it is of satisfactory value.

Mohican Mining Co.—This mine, which has given employment to 30 men for seven or eight years past, has been closed down for the present at least.

Georgiana.—This mine, near Carters, owned by Floyd, Sharwood & McTarnahan, has been bonded by a company for $12,000.

COLORADO.

BOULDER COUNTY.

Caribou.—This old silver camp, one of the richest in Colorado early history, was pretty nearly wiped out by a fire on Nov. 14, the loss approximating $50,000, with very little insurance.

Gold Medal Mill.—This mill, on Four Mile creek, 6 miles from Boulder, was destroyed by fire, Nov. 15; fire supposed to be of incendiary origin, loss being $7,000, with $3,500 insurance. The mill was being built by the Boulder Consolidated Mining & Milling Co., with C. W. Know, of Boulder, as manager. The machinery had all been installed, with the exception of the roasters and cyanide vats. The mill will be rebuilt at once.

Caribou Mine.—Col. S. B. Dick, president of the Colorado & Northwestern Railway, with a party of Pennsylvanians, have been looking at the old Caribou property, in Caribou district, which is owned by the R. G. Dun estate, and is credited with a silver production of nearly $8,000,000, and it is understood that the property is to be operated on extensive lines, probably by a tunnel, which would unwater it and other mines in that district.

CLEAR CREEK COUNTY.

Continental Mines, Power & Reduction Co.—H. I. Seemann, of Denver, with Eastern capital, has incorporated this company, intending to bore a tunnel from Fall river, in the Yankee district, to James Peak, which will open up many claims, with greatly increased depth. It is also reported that the tunnel may be extended to Middle Park, in Grand county, or on the other side of the range, and that capital sufficient to keep up operations for three or four years has been assured. It is the intention to erect a large mill at the mouth of the tunnel to treat the ores found. H. I. Seemann, Equitable Building, Denver, is manager.

Sun & Moon Mining & Milling Co.—Manager R. C. Bonney, Idaho Springs, has been given $75,000 for the purpose of developing the Elkhorn group and other property, recently acquired by this company, the work, or a large part of it, to be carried on through the Newhouse tunnel.

GILPIN COUNTY.

Baby Eddie Mining Co.—E. Ellis, of Idaho Springs, and Pittsburg, Pa., business men have organized this company for the purpose of operating a group of claims in the Freeland district, and it is intended to equip the Baby Eddie tunnel with electric machinery.

St. Joseph Mining & Milling Co.—This company has purchased for the consideration of $50,000 the St. Joseph group of claims at the head of Silver gulch, and as soon as the workings of the group are drained by the Silver Gem tunnel, operations along liberal lines are to be carried on, with Thomas O'Brien, Central City, as manager. Pennsylvania capital is interested.

Linn Consolidated Mining Co.—It is reported that this company will shortly make arrangements for the erection of a large concentrating mill to handle the product of low- and medium-grade mineral, developed in the Mineral Chief property. W. C. Hood, Silver Plume, is manager.

Ninety-four Tunnel Mining Co.—Omaha, Neb., capital is interested, and the owners are contemplating arrangements to secure the transmission of electric power from the United Power & Light Co., at Lawson. This action is necessary on account of the scarcity of fuel in the Yankee district. G. W. Possell, Yankee, Colo., is manager.

Old Town Mining & Milling Co.—Lessees in the 800-ft. level of the Old Town mine, in Russell district, received returns this week from a carload shipment giving high values in gold and silver, and 4% copper. G. K. Kimball, Jr., Idaho Springs, is manager.

Gower Mines Syndicate, Ltd.—A crosscut has been driven to the vein, a distance of 34 ft. from the shaft at the 13th level, opening up over 12 in. of a smelting streak, showing gray and yellow copper ore and iron of the usual high values, alongside of which there is a body of concentrating ore. Company operates the Running Lode, one of the best dividend payers in the State. T. Dunstone, Black Hawk, is superintendent.

Carr Mines Co.—This is the new incorporated name of the new purchasers of the Colorado-Carr property, in Gregory district, sale having been made last month to Easterners for $50,000. The shaft is to be sunk 200 ft. deeper, being now 850 ft. W. H. Hook, Central City, has been appointed superintendent.

After Supper.—Deeds have been placed on record showing a transfer of two-thirds of this property in Black Hawk district to Denver people, for a consideration of $13,000.

Geiger.—Burton K. Lewis, of Iowa, has purchased five-eighths interest in this group of claims, in the Pine creek district, for a consideration of $10,000, and it is reported that active operations are to be carried on again.

TELLER COUNTY—CRIPPLE CREEK.

Henry Adney.—At this mine, in the gulch between Beacon and Rosebud hills, a new ore-shoot has been opened on the 400-ft. level, which looks promising.

Independence Consolidated Mining Co.—The announcement was made recently that J. T. Milliken had bought a controlling interest. At a meeting held Nov. 24, there was a general reorganization, the following directors being chosen: A. A. Rollestone, A. T. Holman, Victor, Colo.; W. G. Montgomery, Meeker, Colo.; H. McGarvy, Colorado Springs, Colo.; J. T. Milliken, St. Louis, Mo. The board elected J. T. Milliken, president; H. McGarvy, vice-president and general manager; A. A. Rollestone, treasurer; E. L. Bentz, secretary; A. T. Holman, mine superintendent. Mr. Milliken succeeds Eben Smith, of Denver. A branch is to be opened in Colorado Springs.

IDAHO.

IDAHO COUNTY.

Buffalo Hump District.—Snowfall is beginning early in Buffalo Hump, and the miners hope for plenty of water next year. The Jumbo, the principal property, has been forced to stop its 24 stamps because of the dry weather. Manager Frank Brown says the chlorination plant will be operated, and that 12 men will be kept in the mine. The assessment on Jumbo stock has all been paid, and only $285 worth of stock was sold as delinquent.

Thunder Mountain District.—The Sunnyside Co., in Thunder Mountain, has completed assessment work on 30 outlying claims. At the Sunnyside mine itself, 45 men are on the payroll. At the Dewey 10 stamps are treating 55 tons a day. Straight amalgamation is used, and 85% of the values are said to be saved on the plates. W. A. Douglass, manager of the Pearl Gold Mining Co., better known as the Adams Co., has taken an option on a property at the head of Indian creek, and will work 20 to 30 men all winter. The Elspass mill on the Pearl, on Divide creek, will be started in the spring.

NEVADA.

STORY COUNTY—COMSTOCK LODE.

Occidental Consolidated Mining Co.—At the annual meeting in San Francisco last week 85,000 shares were represented and the following directors were elected: George R. Wells, Herman Zadig, A. S. Wollberg, Nat. T. Messer and J. J. McCarthy. George R. Wells was elected president, Herman Zadig vice-president, A. K. Durbrow secretary, and James H. Kinkead superintendent.

PENNSYLVANIA.

BITUMINOUS COAL.

Pittsburg Coal Co.—It is announced that a contract has been closed between the Pittsburg Coal Co. and the Republic Iron & Steel Co. whereby the coal company is to furnish the steel concern with all the coal it may call for during the next five years. The Republic Co. agrees to take each year at least 500,000 tons of coal, reserving the right to demand up to 750,000 tons each year. The contract is to run for five years. In addition to the lump coal that is to be supplied regularly, the steel company will take all the slack the coal company may find it convenient to ship during the summer months. Dur-

ing the winter lump coal will mostly be shipped. In the event of a scarcity of slack the contract specifies that the coal company is to crush the lump coal and ship the same as slack at an additional charge. The arrangement is a distinct advantage to the coal company, owing to the plentifulness of slack in the summer and its scarcity in winter. The contract covers practically all the coal used by the steel company in the Pittsburg district, and it is estimated that upward of 8,000,000 tons will be used during the five years the contract is to run.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Hidden Fortune Co.—Alexander Prussing, one of the principal stockholders of this company, of Chicago, has been in conference with K. G. Phillips, of Deadwood, receiver of the company. The Chicago stockholder represents close to 2,000,000 shares of stock. It is expected that matters of this company will be straightened up very soon and work resumed at the mine and mill. Mr. Prussing and the receiver will work in harmony.

Gilt Edge-Maid Co.—Two additional slime tanks are being added at this company's mill, which will increase the capacity 25 per cent.

Homestake Mining Co.—It is stated that this company intends to instal skips at the Ellison hoist, displacing the cages. A 500-h.p. Pelton wheel connected to an electric generator is being installed at Englewood, to furnish power for the Monroe and Mineral Point stamp-mills at Terraville, each mill having 100 stamps. Work is being pushed on the excavation for the slime plant at Deadwood, and the several miles of pipes will be laid before the ground freezes.

Horseshoe Mining Co.—W. L. McLaughlin, general manager, has returned from Pittsburg and states that the reorganization of the company has practically been completed. Pluma will be chosen as the place for the new 300-ton cyanide plant.

Golden Crest Co.—It is announced that the cyanide plant owned by this company will be in operation by the first of the year. A new strike of high-grade ore has been made.

Columbus Consolidated.—It now develops that William Sauntry, of Stillwater, Minn., and friends, have secured possession of about 95% of the company's stock. None of the stock is now on the market. It is stated on good authority that the company will soon begin the erection of the 1,000-ton mill on its property. The company owns the old Columbus mine, which carries the extension of the Homestake veins on the north end.

Big Lead Co.—An excavation has been commenced for a mill by this company on a property on Elk creek. Several veins of free milling ore have been disclosed.

Yellow Creek.—P. A. Gushurst, of Lead, has sold to James Halloran and W. B. Malkson, of that city, interest in several claims in the Yellow Creek district. Ore of high grade has been shipped from the group, and it will be developed further.

Victoria Extension Co.—Some of the principal stockholders of the Victoria Co. have organized the Victoria Extension Mining Co. W. M. Glass, of Omaha, is president; Arthur C. Smith, Omaha, vice-president; Freeman E. Steele, Deadwood, treasurer and general manager; and J. C. Carson, Deadwood, secretary. The ground takes in the old town-site of Preston, and contains a number of ore-shoots. A shaft is being sunk to find the different contacts.

Dividend Mine.—Henry Schnitzel, of Lead, has leased the Dividend mine in the Bald Mountain district, and will ship ore to the Lundborg-Dorr mill at Terry. The mine produced $63,000 in 1897. A lease was secured through N. T. Mason, of Deadwood.

PENNINGTON COUNTY.

Deep Down Mining Co.—The following officers have been elected by this company at the annual meeting: President, A. R. Johnson; vice-president, John Forsythe; secretary and treasurer, Henry Saville; all of Keystone. The ground is well developed and is located near that place.

Grandview.—L. A. Richards has started two shifts at work on this mine at Silver City.

UTAH.

BEAVER COUNTY.

Frisco Contact.—Conditions are very encouraging at this property at the present time. The management is driving for an extension of the famous Horn silver vein.

Indian Queen.—This property is being energetically developed by a tunnel, which is now 550 ft. long.

Skylark Copper.—Development work is progressing favorably at this property, which gives promise of becoming a producer in the near future.

JUAB COUNTY.

Godiva Mill.—The machinery for this plant has begun to arrive from Hailey, Idaho, where it was in use at the Tip Top property.

Beck Tunnel.—The initial car of ore shipped from this mine this week netted $34.75 per ton. An ore-house is under construction, and the company proposes to inaugurate regular shipments.

SALT LAKE COUNTY.

South Columbus.—The driving of the tunnel in this Alta property will be resumed about January. The adit is now 1,350 ft. long.

Boston Consolidated.—This Bingham mine, Manager Louis S. Cates states, will be ready to supply 750 tons of ore daily to the new Garfield copper smelter as soon as the latter is completed.

VIRGINIA.

The Virginia Iron, Coal & Coke Co. and the Lowmoor Iron Co. have added an extensive acreage to their iron-ore holdings recently. The deals involve the lease of 50,000 acres of iron-ore property in Potts Creek valley, the land acquired by the Virginia Iron, Coal & Coke Co. being about 25,000 acres in the southern portion of the tract, while the Lowmoor Iron Co. gets about an equal amount of ore lands in the northern portion. The Virginia company will not actively develop its property at once, but will do so within the next year or two. The ore is largely a brown hematite and the deposit is an extensive one, though, as is the case with other iron property in Virginia, there has never been such a thorough testing with drill holes as would give data for a close approximation of the amount of ore. The Chesapeake & Ohio railroad will make the extensions necessary to reach the ores in the Lowmoor Iron Co.'s portion of the tract. It will build a line from Covington, Va., 30 miles into Potts Creek valley, making a junction with the Norfolk & Western. The latter road will run a line 45 miles long in the new orefield from a point on its New River branch, near the mouth of Stony creek, having bought the Stony creek road.

WASHINGTON.

FERRY COUNTY.

Pearl Consolidated Gold Mining Co.—A new blacksmith shop has been completed, and work has been resumed sinking the main shaft, to strike the Lone Pine vein on its dip below the lower tunnel level.

Belcher.—A power plant is being installed on Lambert creek for driving electric drills in this and the Hawkeye mine. A 32-h.p. gasolene engine will be used. An extra force of men is employed, preparing to change from hand work to machine drilling.

Hawkeye.—Good progress is being made on a tunnel to strike the vein at about 150 ft. deep.

Mountain Lion.—Work is to be resumed on the mine shortly. Work is in hand at the mill, preparing for the installation of Wilfley concentrating tables, to be used in experimenting on ore from several mines of the district.

Copper King.—The mine continues to improve. In crosscutting the orebody on the lower tunnel level a streak of argentiferous galena was struck. The main orebody is iron sulphide, carrying gold and copper. The management is preparing to resume shipping ore to the smelters.

Oversight.—Only one shift is employed now, but the company expects to enlarge

the force and get ready to ship ore about January 1.

OKANOGAN COUNTY.

Tungsten Consolidated Mining & Milling Co.—Articles of incorporation have been filed with the Secretary of State and the county auditor, naming as trustees for the first six months Dr. A. M. Polk, Henry Bahrs, Wm. H. McDaniel, Samuel W. Johnson and F. M. Dallum. The trustees have elected for president and general manager, Henry Bahrs; vice-president, F. M. Dallum; secretary, E. J. Baton; treasurer, W. H. McDaniel.

The Tungsten group consists of two tiers of claims—the Tungsten, Wolframite, Cathedral, Armor Plate, Radium, Elizabeth, Henrietta and Marie—6,000 ft. in length by 1,200 ft. in width, on two well-defined quartz veins, which were discovered 3 miles east of Cathedral Peak, near the summit of the Cascade mountains, 1½ miles south of the international boundary line. The veins are, respectively, 4 ft. 10 in. and 8 to 18 in. wide. The ore will concentrate 10 to 1; the concentrates are 73% tungstic trioxide, according to the Primos Chemical Co., of Primos, Pa. Six men are employed on development. Good winter quarters have been completed, and provisions and mine supplies packed to the camp to last until next June.

Grand View.—No. 3 tunnel is in 325 ft., and, being in softer ground, is making 20 ft. headway a week. The vein is widening at the face, and the ore looks well. The rail tower for the tramway is completed and hangs over a precipice 1,800 ft. vertical elevation above the mill. It is claimed this will be the longest span of and aërial tramway in the world, and the tramway the most substantially built of any in the Northwest. The cables have arrived. The timbers are all framed. The terminals and rail towers will be set up as soon as the bolts and equipment are delivered on the ground. A 500-ton ore bin is being constructed at the upper, and a 400-ton bin at the lower terminal.

Palmer Mountain Tunnel & Power Co.—The concrete power-house is finished and ready to receive the machinery. It is a very neat and substantial building. A cottage has been built near it for the electricians' residence. The flume is completed and water turned in for trial along its entire length. The headgate is in, and the mason work is of concrete and very solid.

Copper World Extension.—The shaft is down 210 ft. The south crosscut at the 200-ft. level was in 32 ft. when last reported. The ore from the north crosscut, at the 100-ft. level, is an excellent smelting material and runs 2.43% copper, 4 oz. silver and $1.40 in gold per ton, with 45% excess of iron. The machinery, including a hoisting engine and air-compressor, are housed in, and everything at the mine is in the best shape for winter. The haulage of 240 cords of wood is finished.

Pinnacle.—The miners have been withdrawn from the middle tunnel. The lower tunnel, started at the base of the hill, has passed four sets into the slide rock. Solid rock has not yet been encountered. This tunnel is expected to cross several veins.

WEST VIRGINIA.

In the case of Griffin against The Fairmont Coal Co., the Supreme Court has reversed the decision of the Circuit Court, and holds that the surface owner can claim damages from the owner or lessee of the coal rights, if mining is so conducted that the surface caves, or sinks, and if property is endangered by failure to supply proper supports in the underground workings.

FAYETTE COUNTY.

Gordon Coal Co.—This company's tipple No. 5, at Montgomery, recently destroyed by fire, is being rebuilt.

MINGO COUNTY.

Pike Colliery Co.—This company has its new colliery fully at work. It is at Piketon, 10 miles east of Williamson.

Federal Coal & Coke Co.—This company has begun to build a large coal tipple at Gray's Flats.

MONONGALIA COUNTY.

Deckers Creek Coal Co.—This company has completed 75 new coke-ovens at Richard, and has begun to build 300 more at Bretz.

Foreign Mining News.

CANADA.

ONTARIO.

John E. Merritt and Louis Merritt, of Duluth, who have been prospecting in the Nipigon district, state that they have discovered indications of large bodies of iron ore. Samples of a high grade have been obtained.

The Ontario government has given to the Timiskaming & Northern Ontario Railway Commission full control over the cobalt-silver locations on the right of way, as well as those on the town-site of Cobalt. Some of these are said to be rich. The income derived from them is to be used for the railway as the commission may decide.

NOVA SCOTIA.

Colonial Copper Co.—The United States Circuit Court in New York has appointed a receiver for this company, in a suit brought by Fletcher H. Speed, of Baltimore, who claims $5,000, and charges that the company is bankrupt. Lawrence Godkin is receiver. The company has an office at 32 Broadway in New York; its mining property is at Cape d'Or, N. S., where some development has been done.

AFRICA.

TRANSVAAL.

The following summary exhibits the nominal and market values of the shares of corporations engaged in the mining industry on the Rand:

	Nominal Capital.	Market Value.
63 producing gold mines	£33,052,120	£85,632,047
69 non-producing gold mines.	28,072,697	36,154,184
38 finance and land co.'s	38,169,020	95,851,485
Total	£99,293,837	£217,637,716

This year 57 of the producing mines declared profits. The average profits per month during 1905 amounted to about £530,000.

NATAL.

Coal production in August is reported at 103,544 tons, an increase of 30,877 tons over August, 1904. There were 3,078 tons exported, and 50,888 tons sold to steamships in the port of Durban.

EUROPE.

SPAIN.

Rio Tinto Co., Ltd.—A circular from the London office, dated Nov. 3, says in part: "Notice is hereby given that at the extraordinary general meeting of the company, held this day, resolutions which had been passed at a previous meeting were confirmed as special resolutions, increasing the capital of the company by £250,000, divided into 50,000 ordinary shares of £5 each, and, as proposed by the board, directing that the new shares be in the first instance offered to the holders of existing ordinary shares in proportion as nearly as might be to the number of ordinary shares held by them, respectively, at such price as might be determined by the board, and that so many of the said new shares as are not taken by the holders of such ordinary shares within such time as might be appointed by the board, might be disposed of by the board as they think fit.

"In pursuance of the said resolutions, and of a resolution of the board, the new shares are now offered at the price of £63 per share (*ex* the interim dividend) to the holders of the existing ordinary shares, in the proportion of one new share for every complete number of seven existing ordinary shares held by each shareholder. The new shares will rank for dividend on the full nominal amount thereof *pari passu* with the existing ordinary shares in respect of all dividends hereafter declared.

"The price of each share is payable as follows: £3 by remittance with the application; £60 on or before Dec. 20. The company's 4% mortgage bonds will be accepted in or toward payment for new shares."

Mineral Imports and Exports. — Imports of fuel into Spain for the nine months ending Sept. 30 were 1,580,718 tons of coal and 104,354 tons of coke. Exports of minerals for the nine months

are reported by the *Revista Minera* as follows, in metric tons:

	1904.	1905.	Changes.
Iron ore	5,466,162	6,151,997	I. 685,835
Copper ore	819,773	765,354	D. 54,419
Zinc ore	101,301	101,092	D. 209
Lead ore	3,386	4,689	I. 1,303
Pyrites	347,051	539,001	I. 141,950
Salt	278,548	289,863	I. 11,315

Exports of metals for the nine months were 43,478 tons of pig iron, against 32,892 tons in 1904; 40,657 tons of copper, an increase of 17,502 tons; 1,162 tons of spelter, a decrease of 407 tons; 127,698 tons of lead, a decrease of 6,182 tons from last year.

NEW CALEDONIA.

Exports of minerals from the colony, for August and the eight months ending Aug. 31, are given by *Le Bulletin du Commerce*, of Noumea, as follows, in metric tons:

	August.	Eight Mos.
Nickel ore	12,994	85,310
Cobalt ore	947	5,283
Chrome ore	5,577	38,746

Coal Trade Review.

NEW YORK, Nov. 29.

ANTHRACITE.

The hard-coal market gains in strength, although, were it not for difficulties in transportation, producers would have no difficulty in keeping up with their orders. As it is, the necessarily restricted output of the mines supplies about two-thirds of the present demand. As soon as the lake season closes an improved condition may be looked for in shipments to tidewater and the East.

Wholesale prices remain as follows: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30 @$1.35 for barley, f. o. b. New York harbor shipping points.

BITUMINOUS.

Shippers of soft coal to the Atlantic seaboard are making more headway than they have for some time. Contracts are absorbing nearly the entire output of the mines, leaving but very small stocks to supply immediate business. The question has degenerated into one of transportation. A desire to stock up to the limit of storage capacity appears to be quite general, particularly in the East, where the memory of conditions during the last strike is still vivid.

The far East is calling for heavy shipments and many of the receiving ports are congested. The Sound is striving to recover from its backwardness during the Fall. New York harbor shows an active absorption of all arrivals; prices have advanced by about 10c. per ton over the quotations of last week.

All-rail trade continues its demand for coal and cannot be satisfied; $1.50 at the mines is offered on all hands. Car supply is variable and so short that mines are everywhere running on part time; an improvement is looked for as soon as cars are released from trips to the lake ports.

Vessels in the coastwise trade are in good supply, particularly large ones. For export shipments to the West Indies and South America also, vessels are procurable at moderate rates. Coastwise rates remain at the same quotations as last week.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to Nov. 11, in short tons:

	1904.	1905.	Changes.
Anthracite	3,868,520	3,905,819	I. 37,299
Bituminous	23,388,633	25,712,869	I. 2,324,236
Coke	7,386,429	9,596,157	I. 2,209,728
Total	34,643,582	39,214,845	I. 4,571,263

The increase in anthracite this year has been light. The gain in coke is the largest proportionally.

Shipments of coal coastwise from Atlantic ports for the nine months ending Sept. 30 are reported as follows, in tons:

Ports.	Anthracite.	Bituminous.	Total.
New York	10,853,970	6,434,082	17,288,052
Philadelphia	1,497,157	2,907,956	4 405.113
Baltimore	178,188	2,052,081	2,230,269
Newport News	.....	2,079,338	2,079,338
Norfolk	.....	1,876,062	1,876,062
Total	12,529,315	15,349,519	27,878,834

The total increase this year was 3,155,515 tons, or 12.8%. New York figures include shipments from harbor points to New York city.

Rail shipments of coal from Ohio mines are reported by the Ohio Coal Traffic Association as below, in short tons, for the nine months ending Sept. 30:

Railroads.	1904.	1905.
Hocking Valley	2,791,867	2,895,049
Toledo & Ohio Central	1,433,184	1,121,610
Baltimore & Ohio	1,185,803	1,480,870
Wheeling & Lake Erie	1,696,885	1 907,124
Cleveland, Lorain & Wheeling	1,173,462	1,504,220
Zanesville & Western	655,823	690,511
Toledo Division Penn. Co.	1,377,073	1,319,906
Lake E., Alliance & Wheeling	200,312	551,433
Total	10,514,409	11,170,723

This shows a total increase of 656,314 tons, or 6.2%, this year.

Shipments of coal from ports on Lake Ontario and Lake Erie, with receipts at Upper Lake ports are given by the Bureau of Statistics as below, in short tons, for the year to Sept. 30:

	Shipments.	Receipts.
Anthracite	2,346,243	2,322.529
Bituminous	8,227,470	6,961,265
Total	10,573,713	9,281,794

The shipments include 1,301,468 tons furnished to vessels for fuel consumption.

Birmingham. Nov. 27.

Every ton of coal being mined in this State is finding a ready demand. At the mines of the Tennessee Coal, Iron & Railroad Co., in the Pratt mines division, there is a decided improvement, and the strike of the union miners is being forgotten by degrees.

The Pratt Consolidated Coal Co. is increasing its daily production right along. It is proposed in time to improve the output to 20,000 tons a day.

The development in the upper Cahaba coalfields in this State is beginning to show. The new mines of the Tennessee Coal, Iron & Railroad Co., near Henry Ellen, in the northeastern part of Jefferson county, are doing nicely. A small mine near Leeds, in the same section of the State, producing peacock coal, will be enlarged. Col. L. W. Johns is opening a mine near Odenville, in St. Clair county.

Chicago. Nov. 27.

There is little change in the coal business from the conditions noted last week. Business continues very firm; the car shortage restricts supplies greatly and keeps prices up above the normal for the season, and prospects are no brighter for increased supplies in the coming winter months.

The unusually mild weather of the last week has restricted buying. It is generally believed, however, that the business is on a very firm basis, inasmuch as a sudden spell of cold weather over the upper Mississippi valley, such as is bound to come soon, will result in large orders from every direction. This applies especially to domestic coals, which are everywhere in short supply.

There is a good deal of skirmishing about by users of steam coal for supplies on contracts, the inability of operators to fill contracts in default of cars being generally complained of. It is probable that there will be an unusually active market for non-contract coal this winter.

The anthracite market still suffers from the mild weather and from the apathy of consumers as regards laying in stocks for the winter.

Fine coals are growing firmer. Of Eastern coals smokeless continues to lead, in good demand and short supply. Quotations are: Illinois and Indiana lump, $2.50 @$2.85; run-of-mine, $2@$2.45; screenings, $1.45@$1.75; Hocking, $3.40@$3.85; Smokeless, $3.30@$3.50 (run-of-mine).

The speculative market continues in bituminous coals generally and doubtless will continue indefinitely, arrivals being uncertain and prices fluctuating consequently daily 10@25c. on the higher grade coals.

Cleveland. Nov. 28.

Coal prices have been moving upward during the past week on competitive conditions. Toledo, Chicago and Detroit have been bidding for Ohio and Pennsylvania coal in this territory and offering $1.35 at the mines. This has naturally drawn a good deal of coal out of this market. In addition, the car supply is short. The lake demand is excessively strong, with only a scant supply. The result naturally is much higher prices. In this market run-of-mine coal has been selling at $1.20@ $1.30 freely, with higher prices predicted. There is also an excellent call for slack. Some Cambridge slack, bought at 65c. at the mines, was sold at 75@80c., and now there is a demand for more of it at 90c.

Ohio No. 6 slack is selling at 80@85c. at the mines, with the demand for Pittsburg No. 8 about keeping the pace; that coal is sold at 75@80c. at the mines.

In the Lake movement, it is a question of borrow and lend coal. There is a strong demand up the lakes, and the amount given each shipper by the railroads indicates peddling to keep all of them appeased. The result is that it is extremely difficult for the railroads to get enough coal here to load one of the big boats. At the same time, the railroads are confiscating coal for their own use, paying the market price, which is 30@25c. above their contract price. Everything indicates extreme shortage of coal. One big mine operator in this territory reports that for the past month the car supply has been about 30% of the normal. Others make similar reports.

In coke, the market is exceedingly strong. There is a steady demand at good prices. The best grades of furnace coke are selling at $3 to $3.25 at the oven.

Pittsburg. Nov. 28.

Coal.—A large contract was closed during the week between the Pittsburg Coal Co. and the Republic Iron & Steel Co. It is for all the coal that may be required by the steel company for a period of five years, and not less than 500,000 tons is to be taken each year, while the right is reserved to demand up to 750,000 tons. The Pittsburg Coal Co. also has received contracts to supply the St. Louis and Cincinnati gas works with coal for the coming year. John Mitchell, president of the United Mine Workers, who has been in Pittsburg for the past two weeks, repudiates the interview sent out by a correspondent which credits him with having predicted a big strike in both the anthracite and bituminous fields when the present agreements expire on March 31, 1906. He declares positively that he never has expressed an opinion and will not until the annual convention of the organization in Indianapolis in January. The railroad mines in this district are running irregularly, owing to the lack of cars, but all the river mines are in full operation. The demand is good and prices have been advanced by some interests to a basis of $1.30 a ton for run-of-mine at the mine.

Connellsville Coke.—The car supply was excellent last week, and some gains in production and shipments were made. The price remains firm at $3 a ton for furnace and $3.50 for foundry for the rest of this year, and for the first quarter of next year. In some cases a premium has been paid for foundry coke. The production for the week is given at 276,188 tons in the Connellsville region. The shipments aggregated 11,936 cars distributed as follows: To Pittsburg and river points, 4,289 cars; to points west of Pittsburg, 6,353 cars; to points east of Everson, 1,303 cars. The combined shipments from the Connellsville and Masontown fields for the week amounted to 352,199 tons.

San Francisco. Nov. 23.

J. W. Harrison's circular of this date says: "Since our last, there have been three arrivals of Australian coal; total, 10,429 tons. These three cargoes arrived here very opportunely, as very little colonial coal remained unsold in first hands. There are 20 vessels on the chartered list to carry coal from Newcastle, N. S. W., with a carrying capacity of about 50,000 tons; several of these vessels will not arrive this year. There have been six cargoes of British Columbia coal delivered here this month, amounting to 28,649 tons, with promises of a material increase on the quantity shipped monthly during the winter months. The principal quantity of coal arriving here recently has been delivered from ships' side, going direct to the consumers and small dealers, thus saving the yarding expense. The prices remain unchanged, although the handling of fully 90% of the fuel received here is concentrated in very few hands, and an increase in prices can be readily made. The settlement of the labor troubles in Nanaimo is leading to increased shipments from that section, and the character of the output is said to show a marked improvement. Fuel oil is maintaining its firm hold here among steam consumers; its marked economy against the use of coal will insure it in its present position for a long time to come. Up to date we have had an exceptionally mild winter, which serves to minimize the use of household coals."

For coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wellsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Nov. 29.

The official statement of the production and selling price of coal in Belgium for the year 1904 is as follows, in metric tons; the average value per ton is reduced to United States currency:

	Tons.	Value.
Hainault	16,152,560	$2.38
Namur	721,520	2.11
Liege	5,887,350	2.56
Total	22,761,430	$2.41

The totals given are screened coal, as sent to market. There were 273 shafts working, owned by 122 companies. There were 138,567 persons employed, giving an average output of 164 tons per employee.

Iron Trade Review.

New York, Nov. 29.

There is little to say this week, except that the iron and steel markets continue very strong. In pig iron, there has been heavy buying and a general advance in prices. Very few furnaces have iron to sell for delivery before the second quarter of 1906; and many are sold up to July. Late buyers have to pay premiums to get anything like the deliveries they need. There seems to be little or no speculative iron in sight.

In finished materials, the story is the same. In plates and structural steel, any talk of early deliveries is laughed at. Even premiums will not bring them. The mills have more than enough to do to keep up with their contracts.

Car supply is an irritating element in the trade, and there is general complaint about delays in shipments; while the mills are unable to clear their yards and to start orders that are ready to forward to customers.

While there has been no general agreement, it seems to be universally understood that prices of Lake ores to outside buyers will be 50c. a ton higher than during the past season.

Birmingham. Nov. 27.

Alabama pig-iron manufacturers are beginning to consider business for delivery during the latter part of the first quarter and into the second quarter of the coming year. The shipments from this section are still greater than the production. The production for November in Alabama will be but little, if any, better than it was in October. The shipments, however, will show a decided gain over what it was last month. The report of the Alabama Car Service Association for the month of November will show a good gain over the same month last year, and also a gain over the number of cars handled in October, 1905.

The following iron quotations are given: No. 1 foundry, $15@$15.50; No. 2 foundry, $14.50@$15; No. 3 foundry, $13.50 @$14; No. 4 foundry, $12.50@$13; gray forge, $12; No. 1 soft, $15@$15.50; No. 2 soft, $14.50@$15.

Rumors are persistent in this district concerning a merger between the Tennessee Coal, Iron & Railroad Co, the Sloss-Sheffield Steel & Iron Co., the Republic Iron & Steel Co. (Alabama properties) and the Alabama Consolidated Coal & Iron Co.; but there is absolutely no definite statement on the matter. The facts that John W. Gates was known to be buying stock in the Sloss-Sheffield Co., and that the stock of the Tennessee Co. was rising, are taken as a sure indication that there is something doing. J. C.

Maben, president of the Sloss-Sheffield Co. went East a few days since, and this added to the rumors.

The Williamson Iron Co. will shut down its plant in this city as soon as existing contracts have been filled. The company has sold its property to the Illinois Central railroad, and on Jan. 1 will redeem all outstanding bonds, the sale of its property making this possible.

The Birmingham Iron & Steel Co. will erect a steel foundry in this district during the early part of the coming year. The present plant, located in the city, though small, has been successful. W. T. Adams, of Corinth, Mass., is at the head of this concern.

Chicago. Nov. 27.

The last week has seen something of a lull in the iron market, but there are no signs that trade is going backward. Rather, the present conditions are welcomed by both sellers and buyers as affording a temporary breathing spell and opportunities to size up the prospects for the future. All signs point to continued strength of the market, both for pig iron and finished products.

Prices continue firm at last week's quotations. Lake Superior charcoal, scarce and likely to continue so, brings $19.50@$20. Southern sells for $14.50@$15 Birmingham, or $18.15@$18.65 Chicago. Northern iron sells for $19@$20, with the tendency toward the higher limit.

Orders for finished steel and iron products are very large, with no signs of diminishing. Rails, structural steel and forging billets are particularly strong.

Most of the buying is for the second quarter of 1906, but there is yet a large amount of iron according to leading agents, to be supplied for the requirements of the first quarter. Orders are now running into the third quarter of the coming year, with the tendency of buyers to contract farther ahead than sellers are willing to agree to on the present basis of prices. Spot sales are for small quantities, but numerous, and premiums of 50c. to $1 on such orders obtain generally.

The purchase by the United States Steel Corporation of 2,500 acres of land in Indiana is taken locally to mean that the iron and steel interests about the southern end of Lake Michigan are established beyond the possibility of removal, and that the company's intention is to enlarge greatly, within a few years, its production in this locality.

Cleveland. Nov. 28.

Iron Ore.—The movement for this season is about over on the lakes, and buying for next year is not yet under full headway. The market all through has been strong. Some few wild cargoes have been moved, and carrying rates have ranged as high as $1.25 from the head of the lakes to Ohio ports. Estimates of the total production for the year in the upper lake region run close to 33,000,000 tons, since it is supposed that shipments up to Dec. 10, including those of November, will run close to 4,000,000. It is now virtually assured that the movement for November is over 3,000,000 tons.

Pig Iron.—Inquiries have not been quite as strong during the past week for pig iron as recently. The market has eased materially in that respect, but prices have not weakened. No furnace in this territory is known which has any iron for prompt shipment, and all needs are covered from outside this region, iron coming either from the East or the South. The latter is furnishing most of the spot iron, a few furnaces there being in position to sell to this trade on the basis of $14, Birmingham, for No. 2. Foundry iron for delivery through the first half of next year is now selling in this territory on the basis of $18 for No. 2 in the Valleys. Steel-making irons are strong. The market is firm. The prices hold at about $17.50@$17.75 in the Valleys, some furnaces holding for $18.

Finished Material.—The market continues to show such strength that most of the mills are on the defensive. The car shortage has complicated the situation, delaying the movement of the product to the consumer. The new features are added strength to the sheet situation, due to the increase in price, which had little effect, and an improved demand for pipe. The bar steel situation is also stronger, with heavy inquiries. In all lines, specifications against old contracts are strong.

New York. Nov. 29.

Pig Iron.—A large business is still being done, and some heavy contracts have been closed, including one for a cast-iron pipe foundry. Prices are firm and rather higher.

For Northern iron, in large lots, we quote: No. 1X, $18.75@$19; No. 2X, $18.25@$18.75; No. 2 plain, $17.50@$18; gray forge, $16.50@$17; Virginia foundry is held at $18.60@$19.10 for No. 1, and $18.10@$18.60 for No. 2. Basic has been $18.25@$18.50 for Alabama, and 25c. less for Northern. For Southern iron, on dock, quotations are: No. 1 foundry, $18.75; No. 2, $18.25; No. 3, $17.50; No. 4, $17; No. 1 soft, $18.75; No. 2 soft, $18.25; gray forge, $16.50; No. 2 foundry and No. 1 soft are still rather scarce.

Business in warrants is light. December deliveries are $17 bid, $17.50 asked, for both regular and foundry warrants; January about 20c. higher.

Cast-Iron Pipe.—Prices have been advanced to a basis of $28.50 per net ton for 6-in. pipe, carload lots at tidewater points. The business coming in is heavy for the season.

Bars.—Business is good and prices firm. Iron bars are 1.795c., tidewater, for plain, and 1.845c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25c. the current price, but premiums are asked on special deliveries.

Plates.—Steel plates are still in strong demand. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width. For early delivery premiums are asked; in fact, nearly all business is on a premium basis.

Structural Material.—Small orders continue to come in, and deliveries are uncertain. Prices are nominally unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery. Premiums are asked on special deliveries.

Steel Rails.—No change in standard sections. Light rails are in demand, prices ranging from $25 for 35-lb., up to $32 for 12-lb. rails.

Old Material.—Demand is strong, and prices are firm. No. 1 railroad wrought is $22@$23; No. 1 yard wrought, $21@$22; machinery cast, $14.50@$15; heavy steel melting scrap, $18@$18.50. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Nov. 29.

Pig Iron.—Large transactions are quietly taking place in various grades of iron, the chief activity being in bessemer, basic and No. 2 foundry. The pipe manufacturers have developed, or rather renewed, their activity in placing contracts for forward delivery. The larger buyers are now in the market and some extensive contracts have been placed, concerning the details of which it is impossible to obtain any precise information. The buyers represent large pipe works, engineering and electrical plants, car works and users of special brands. Premiums are offered by buyers for prompt shipment. Rumors prevail that we are on the eve of another sharp advance. Large contracts are pending today for foundry iron, and arrangements have been practically completed for the booking of two or three large orders. Basic iron is exceptionally strong, and negotiations are pending for delivery during the first quarter of next year. Quotations may be given approximately at $19.25 for No. 1X foundry; $18.50 for No. 2X; $18 for No. 2 plain; $18.50 for No. 2 Southern; $16.50 for gray forge. Basic is quoted to-day at $17.50@$18; phosphorus $24.50; bessemer $19.50; and sales of malleable iron have been made at $19.

Ferromanganese.—Forward deliveries for ferromanganese are now being arranged for, and at a sharp advance over previous prices.

Billets.—Open-hearth billets are wanted and cannot be had unless the buyers are willing to concede to the mill people con-

siderable latitude in deliveries. The negotiations pending for several lots hinge upon this point. Late deliveries can be arranged for readily, but at a price higher than our buyers would like to give. The average quoted figure is $30, and for high-carbon steel for special purposes $36@$38.

Muck Bars.—Some business was done this week at $28.

Bars.—Premiums are still offered on bars by buyers who have been waiting for a favorable change, while the larger consumers think they see possibilities of slightly lower quotations for large contracts for late delivery. The mill owners, on the other hand, believe that weaker quotations are improbable. Best refined bar is quoted at 1.63½, some few mills asking a little more. Steel bars are quoted at 1.63½, but nothing is selling at that price.

Sheets.—The sheet makers are picking what business they want and are telling their customers that they must wait their pleasure as to the acceptance of large orders unless they can make deliveries to suit their convenience.

Boiler Tubes.—A little shading on large orders is heard of, but the smaller buyers of this territory are paying outside prices.

Merchant Steel.—A good deal of shafting has been purchased recently and more or less business is being regularly sent to the mills at outside prices.

Plate.—The plate market is exceptionally strong and mills are overrun with inquiries which do not lead to immediate contracts because of the difficulty in arranging deliveries. Premium prices are the rule.

Structural Material.—The structural market is in an excited condition, due to the precipitation of orders and to the second line of aggressive inquiries coming up from the rear, which will call for the attention of the mill people very soon. A vast amount of bridge work has been mapped out and the railroad companies wanting it have given orders that immediate arrangements be made, so that plans can be laid for the proper prosecution of the work.

Steel Rails.—There is still an urgent demand for steel rails and different railway systems are pressing negotiations which have been hanging fire for some time.

Scrap.—The scrap dealers are on the war-path for everything in shape of scrap. They have urgent demand which they are endeavoring to meet and under the rush there is no difficulty in obtaining a little advance. Quotations are given today at $25 for old iron rails, $23.50 for best railroad scrap; same for low phosphorus scrap; $18 for No. 1 steel scrap; $16.50 for machinery scrap, and $15 for wrought turnings.

Pittsburg. Nov. 28.

Sales of bessemer pig iron for delivery in the first quarter have just been closed at $17, Valley furnace, which is taken as an indication that the United States Steel Corporation may satisfactorily arrange its pending deal for a large tonnage with the merchant furnace interests this week. As told in a previous report, the Corporation had agreed to take 50,000 tons at $17, but wanted to option a larger tonnage at the same figure, but the furnaces would not agree. Every effort is being made to prevent a runaway market, and if the big interest only succeeds in getting part of its requirements of outside iron, prices undoubtedly would advance and continue to go up if it came into the market later for more iron. The negotiations, as usual, are being conducted with the greatest secrecy, and reliable information is difficult to obtain until the deals are actually closed. During the past few days a large foundry interest bought 8,000 tons of standard bessemer iron for delivery in the first quarter from several merchant furnace interests, paying the uniform price of $17. Other sales were made at that price, and the total tonnage booked for first quarter amounts to about 15,000 tons. Sales of bessemer iron for early delivery in small lots have been made during the week at $17.50, Valley furnaces, and unless there is a curtailment in the supply of coke, it does not seem likely at this time that prices will go much higher for this year's delivery. If the Corporation succeeds in reaching an agreement for the purchase of about 150,000 tons of bessemer for delivery after Jan. 1 at $17, the danger of a runaway market will be lessened. Sales of foundry iron have been made for first-quarter delivery, and the maximum price paid was the same as for bessemer No. 2 grade, $17, Valley furnaces. The Westinghouse interests bought this week at the price named, but the tonnage secured is not made public. Sales of Lake Superior ore are now being made for next season at an advance of 50c. a ton over the rates that prevailed this season, and it is believed that all of the ore for the merchant furnaces for 1906 will have been sold before the end of this year.

The steel market is very strong and an advance may be ordered at any time in merchant steel bars, plates and structural material. Prices on billets and sheet-bars remain practically nominal as there is a scarcity, and deliveries on orders placed long ago are very unsatisfactory. It was announced today that this year will be a record breaker for the American Sheet & Tin Plate Co., both as to production and profits. The company is runing 75% of its tin-plate mills and 80% of its sheet mills. All would be in operation, but for the inability to get the steel. A year ago the company was operating 70% of its tin-plate and sheet mills. In addition to the increase in the number of mills running, the output is heavier than a year ago, as the limit of production was removed by agreement with the Amalgamated Association of Iron, Steel & Tin Workers. While prices are not as high as those of 1904, the cost of production is much lower and the company has enjoyed greater profits. While steel bars are being held down to 1.50c., iron bars continue to advance. The Republic Iron & Steel Co. has just announced an increase to 2c., Youngstown. Some time ago this company fixed the price at 1.80c., but sales were made at a less rate by other interests. The market now is firm at 1.80c., but no sales are known to have been made at the high rate just announced by the Republic Co. It is said this company is sold up and cannot sell even at the high price it has established. Rail orders are still being placed, the local interest having booked orders during the week for 30,000 tons. There is no doubt that the rail production next year will break all records. Light rails are still in demand, but the price for sections 25 to 45 lb. remains at $26.50; for prompt delivery a premium of about $1 a ton is asked. New business in structural material is being booked daily. The plate trade also is heavy, and an advance will certainly be made before Dec. 15.

Pig Iron.—Sales for the week of bessemer iron exceed 15,000 tons. The bulk is for the first quarter delivery at $17, Valley furnaces, and small lots for shipment this year were at $17.50, Valley. Several lots of foundry No. 2 for first quarter sold at $17, Valley. Gray forge is strong, the minimum price being $16.85, Pittsburg. The Carnegie Steel Co. is now operating all of its blast furnaces, the Zanesville furnace having been put in blast this week.

Steel.—There is no change in the billet market, and quotations continue as follows: Bessemer, $26; open-hearth, $27@$28; forging billets, $30; sheet-bars, $27@ all f. o. b., Pittsburg. Plates remain at 1.60c., and steel bars at 1.50c.

Sheets.—The market shows some improvement and there is not likely to be any shading of the new prices established last week by the leading producer. Black sheets are quoted at 2.30@2.35c., and galvanized at 3.355c. for No. 28 guage.

Ferromanganese.—There is scarcely any ferro to be had, and for prompt delivery $125 a ton is said to have been offered. A week ago two small sales were made at $90 a ton. High prices are not offered for late delivery.

Cartagena, Spain. Nov. 11.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were one cargo, 2,200 tons manganiferous ore, to Great Britain, and one cargo, 496 tons manganiferous ore, to Marseilles. Owing to the continued de-

mand for all classes of ore, and the considerably higher prices now offering, the competition in this sierra for good ores is exceptionally keen, and miners in consequence are having a better time of it than for many months past. Ore freights are still very firm, and the expected weakening has not yet arrived, so that very little ore is being lifted and many f. o. b. sales are getting considerably delayed.

Quotations for iron ores are unchanged Ordinary 50% ore is 7s. 6d.@7s. 10d.; special low phosphorus, 8s. 2d.@8s. 6d.; specular ore, 58% iron, 11s.; S. P. Campanil, 9s. 6d. per ton. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 8d. for 35% iron and 12% manganese, up to 17s. 3d. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

Heavy Chemicals and Minerals.

NEW YORK, Nov. 29.

In continuance of the general tone and tendency of the year, the market for heavy chemicals is characterized by much strength, with steady prices, firm freights and little accumulation of stocks.

Sulphur.—The market shows no change from our last report. We note herewith the prices for the American product. Sicilian is quoted the same for Atlantic ports as the Louisiana product (on the basis of the sulphur content), in the agreement which dates to Aug. 1, 1906.

Pyrite.—This continues unchanged and in steady demand, the production being constantly absorbed (mostly for acid used by the fertilizer makers), and with some difficulty in making the supply equal to the active demand. The domestic supply comes principally from Virginia, Massachusetts, and Alabama, with which may be grouped much of the zinc ore of the Mississippi valley, which also contributes to the production of sulphuric acid.

Nitrate of Soda.—This reports the same prices, with a market which grows stronger. No stocks accumulate, the market absorption being ready and complete, mostly by the manufacturers of fertilizers and blasting powder.

Sulphate of Copper.—This reports another slight advance (15c. per 100 lb.), probably in sympathy both with the metal and with the general market demand.

Phosphates.—Phosphate companies report the same situation. Actual prices in some cases show a slight advance on those recently quoted; but the market is firm (no stocks accumulating), largely on account of heavy contracts. Spot delivery is hard to fill. We discontinue, for the present, quotations on foreign supplies (Algerian, Tunis, Christmas Isle, Ocean Isle, Somme, etc.), as the firms handling these report no importations, the demand being met by the domestic supply. We note herewith a recent general advance of 25c. on Tennessee and South Carolina rock.

Sulphur.		
Louisiana, New York, Boston or Portland	ton	$22.25
Philadelphia or Baltimore	"	22.75
Pyrite.		
Domestic, furnace size	Unit	11c
Fines	"	10c.
Imported, lump, At. ports	"	10@11c.
" fines " "	"	9½@ 0c.
" furnace size	"	11½@12c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb		$4.75
38°, 100 lb		5.25
40°, 100 lb		5.50
42°, 100 lb		5.75
Oxalic acid, com'l, 100 lb		$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton		13.50@14 50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18 00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk, ton		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb		$5.50
Nitrate of Soda, 100 lb	96%	2.25
" " "	95%	2.22½
Sulphate of Ammonia, per 100 lb		3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain. or Europe
*Fla., hard rock	$7.75@8.00	$10.90@12.10
land pebble	4.00@4.25	7.95@ 8.65
†Tenn., 78@80%	4.60@4.65	10.52@10.92
78%	4.00@4.25	.....
75%	3.65@3.75	.....
68@72%	3.25@3.50	.....
‡So. Car. land rock	4.00@4.25	.....
river rock	3.75@4.00	.....

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Metal Market.

New York, Nov. 29.

Gold and Silver Exports and Imports.

At all United States Ports in Oct. and Year.

Metal.	October.		Year.	
	1904.	1905.	1904.	1905.
Gold Exp	$3,855,649	$305,124	$86,895,557	$42,983,045
Imp	8,045,275	10,948,379	76,739,945	41,266,481
Exc	I. $4 189,626	I. $10,633,255	E. $10,155 612	E. $1,716,564
Silv. Exp	3,485,098	4,508,726	42,615,018	43,931,936
Imp	1,717,114	2,089,358	21,294,345	26,598,356
Exc	E. $1,767,984	E. $2,419,368	E. $21,320,673	$17,355,580

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending November 25, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	82 500	$32,261	$837,703	$16,112
1905	34,592,003	10,514,830	30,859,077	3,879,631
1904	94,942,489	5,765 073	33,078,776	1,104,483
1903	31,653,185	13,347,443	29,197,585	3,194,047

Exports of gold for the week were chiefly to the West Indies; of silver to London. Imports, both gold and silver, were from the West Indies, Mexico, and Central America.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Nov. 25 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,102,420,900	$1,012,288,300
Deposits	1,144,212,500	999,177,600
Circulation	42,126,500	54,602,600
Specie	217,957,800	184,466,600
Legal tenders	76,476,700	74,484,900
Total reserve	$294,434,500	$258,951,500
Legal requirements	286,053,125	249,794,400
Balance surplus	$8,381,375	$9,157,100

Changes for the week this year were increases of $4,859,000 in specie, $1,409,800 in legal tenders, and $6,241,950 in surplus reserve; decreases of $4,795,300 in loans, $108,600 in deposits, and $87,300 in circulation.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars.

	Gold.	Silver.
New York Associated	$184,466,200	.....
England	164,871,120	.....
France	579,883,890	$218,492,100
Germany	157,025,000	52,340,000
Spain	74,950,000	112,935,000
Netherlands	33,060,000	30,056,900
Belgium	16,333,335	8,166,665
Italy	128,790.000	15,721,500
Russia	574,625,000	18,820,000
Austria	226,540,000	59,755,000

The returns of the Associated Banks of New York are of date Nov. 25, and the others Nov. 24. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to Nov. 16 are as follows:

	1904.	1905.	Changes
India	£8,685,168	£5,534,721	D. £3,150,447
China	372,722	814.246	I. 415,524
Straits	79,268	38,299	D. 40,969
Total	£9,137,158	£6,387,266	D. £2,749,892

Imports for the week were £193,000 from New York. Exports were £225,100 to India, £10,000 to China and £35,000 to Japan; £270,100 in all.

Indian exchange has been steady, and all the Council bills offered in London were taken at an average of 16.03d. per rupee. Demand for silver on Indian account continues good, notwithstanding the high price.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.49½	$0.50½
Peruvian soles and Chilean pesos	.45½	.47
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

The price of silver has been well maintained. It is the impression that the Indian Government is an important factor in the support of silver; and so long as it continues to buy no great decline is likely.

SILVER AND STERLING EXCHANGE.

Nov.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Nov.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
23	4.86⅛	64⅝	29 13/16	27	4.86	65⅜	30 3/16
24	4.86⅛	64¾	29 15/16	28	4.86	65⅝	30 5/16
25	4.86	65¼	30⅛	29	4.86	65⅝	30 5/16

New York quotations are for fine silver per ounce Troy. London prices are for sterling silver, .925 fine.

Other Metals.

Daily Prices of Metals in New York.

Nov.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
23	17 @17⅛	16¾ @17	75⅜	33½	5.25	6.20 @6.25	6.05 @6.10
24	17⅛ @17⅜	16⅞ @17⅛	76	33⅜	5.25	6.20 @6.25	6.05 @6.10
25	17¼ @17½	17 @17¼	....	33¾	5.25	6.20 @6.25	6.05 @6.10
27	17⅜ @17⅝	17¼ @17½	77⅛	34	5.25	6.25 @6.30	6.10 @6.15
28	17½ @17¾	17¼ @17½	78⅛	34¼	5.25	6.30 @6.35	6.15 @6.20
29	17½ @17¾	17¼ @17½	77¾	34⅜	5.25	6.30 @6.35	6.15 @6.20

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic.

Copper.—A very active business was transacted the first part of the week, as consumers both here and in Europe placed orders quite freely for shipment during the early part of next year. As a result, the market has advanced, but while prices are holding firm at the close, the excitement has materially subsided and quotations are more or less nominal at 17½@17¾c. for Lake copper; 17¼@17½c. for electrolytic in ingots, cakes and wirebars; 16¾@17c. for casting copper.

The speculative sorts in London moved very erratically and the sharp drive against the shorts resulted in the spot price being established at one time at pretty near to £79. At the close quotations are £77 15s. for spot, £77 5s. for three months.

Refined and manufactured sorts we quote: English tough, £78 15s.; best selected, £80; strong sheets, £88; India sheets, £83; yellow metal, 8d.

Exports of copper from New York for the week are reported at 3,031 long tons. Our special correspondent reports the exports from Baltimore for the week at 1,288 long tons of fine copper.

Tin.—Consumption in this metal is increasing, and in spite of the higher prices all the supplies coming on the market are readily absorbed. We quote at the close 34¼@34½c.

The London market has been strong throughout the week, and closes very firm at £155 2s. 6d. for spot, £155 12s. 6d. for three months.

Lead.—There is no change whatever in the situation, the American Smelting & Refining Co. billing its current shipments at 5.25c. New York, 5.17½c. St. Louis.

The foreign market has advanced owing to a scarcity of supplies, and the very heavy consumption, and closes at £16 for Spanish lead, £16 2s. 6d. for English lead.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is scarce and very strong. The latest sales here are on a basis of 5.55c. for Missouri brands.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Nov. 11, that silver has been 14.75 reales per ounce. Exchange is 32.08 pesetas to £1. Pig lead has been 79.50 reales per quintal; equal, on current exchange, to £13 17s. 4d. per long ton, f. o. b. Cartagena. Shipments for the week were 194 tons desilverized and 655 tons argentiferous to Marseilles; 330 tons desilverized and 356 tons argentiferous lead to Newcastle; in all, 1,535 tons.

Spelter.—This metal has at last awakened from its dormant state, and under a very heavy demand on the part of both brass manufacturers and galvanizers, prices advanced from day to day, and close firm at 6.15@6.20c., St. Louis, 6.30@6.35c., New York.

The London market too is showing a very firm undertone, and at the close the quotations are £28 12s. 6d. for good ordinaries, £28 17s. 6d. for specials.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is strong and largely higher. Large sales were made yesterday and today on a basis of 6,20c., East St. Louis. It looks as if prices would go still higher.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Nov. 11, that prices are nominally unchanged at 95 fr. for blende, 35% zinc, and 72 fr. for calamine, 30% zinc. Miners are inclined to ask more. Shipments for the week were 750 tons blende to Antwerp, and 900 tons blende to Swansea.

Zinc Sheets.—Sheet zinc is quoted at $7.50 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 to 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, $7.25; August 10, $7.50. The demand is reported active.

Antimony.—The advance has been well maintained, and the market is practically bare of spot supplies which command fancy prices. Quotations for shipment range from 11¾@13c., depending upon brands.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Manganese Alloys.—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg. delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese Copper, No. 1, 30% Mn	275
No. 2, 28% Mn	180
No. 3, 20 to 25%, with two to 4% iron	165
Manganese Tin, No. 1, 55% Mn., no iron	480
No. 2, 56% Mn., some iron	280
Manganese Nickel, No. 1, free of iron	450
No. 2, traces of iron	270

Manganese metal is quoted as 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled sheets	4c. up.
Aluminum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro Chrom. (75%)	12½c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@98% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.)	40c.
Thallium, f. o. b Breslau, Germany	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in prices depend chiefly upon the size and condition of orders.

Quicksilver.—The market is quiet. The New York quotation is $40 per flask of 75

lb. for large orders, and $41.50@$42 for small lots. San Francisco prices hold steady at $39 for domestic orders, and $37.50@$38 for export business. The London market is a little higher, £7 5s. being quoted, though jobbers are still selling at £7 2s. 6d. per flask.

Missouri Ore Market.

JOPLIN, Nov. 25.

The highest price paid for zinc was $54 per ton, a decline in the top price of $1. The assay basis price was $48@$50 per ton, a decline of $2 per ton.

Lead prices continue to advance, marking an increase of $2.50 per ton for choice bins of ore, with a general advance of $2 per ton on all grades. The highest price paid was $74 per ton, and 80% grades paid $72 per ton, with the demand fully as strong as a month ago, when prices were $10 per ton lower.

The eleven months of 1905 show an increase of nearly $2,000,000 in the value of the ore shipped, compared with the eleven months of 1904, the total for this year having reached $12,002,400. It has been a wonderfully prosperous year for the mine-owners of the Joplin district, prices of both zinc and lead averaging higher than ever before all through the year, with November showing the highest lead price ever recorded and the highest zinc price ever paid in this month. The year seems closing as auspiciuously as it began.

Following are the shipments of zinc and lead ore from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Carterville-Webb City..	1,798,670	685,430	$66,040
Joplin	2,222,270	205,030	61,820
Duenweg	811,430	179,480	25,120
Galena-Empire	848,760	128,020	24,130
Aurora	698,730	.....	11,580
Granby	675,700	17,800	11,420
Alba	417,190	.....	10 630
Oronogo	271,400	41,800	8,355
Badger	225,410	.....	5,410
Neck City	187,750	.....	4,780
Prosperity	135,810	43,380	4,680
Spurgeon	242,130	8,880	4,540
Zincite	136,100	3,920	3,540
Beef Branch	89,770	15,900	1,530
Reeds	58,360	.....	1,400
Stott City	40,930	.....	980
Totals	8,860,410	1,329,640	$245,955
47 weeks	457,929,850	56,353,530	$12,002,400
Zinc value, the week, $198,175; 47 weeks,			$10,282,050
Lead value, the week, 47,780; 47 weeks,			1,720,350

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61.50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July.	33.37	43.00	July	53.00	58.00
August.	37.55	48.83	August.	53.00	58.00
September.	40.18	46.75	September.	53.50	63.50
October.	43.63	47.60	October.	53.50	63.86

Wisconsin Ore Market.

PLATTEVILLE, Nov. 25.

The price of zinc ore did not change materially from that paid last week. The Empire received a little better price than last, owing to its grading up a bit.

Lead is scarce with none reported sold. Following are the shipments as reported from several of the camps:

	Zinc lb.	Lead lb.	Sulphur Ore lb.
Platteville	560,000	.....	.....
Livingston	30,000	.....	.....
Benton	120,000	.....	.....
Galena	292,600	.....	.....
Linden	408,600	.....	30,000
Mifflin	75,000	.....	.....
Total	1,486,200	.....	30,000

Several of the camps were unable to load, owing to the continued scarcity of cars. Every indication points to the continued steady price of ore.

Mining Stocks.

New York. Nov. 29.

General conditions in the stock market remained practically the same. It was a scramble among large inside interests, with fluctuations one way and another as the pull varies. The public was rather on the outside.

The industrials were active. United States Steel closed at $38, with $105¼ for the preferred. Tennessee Coal, Iron & Railroad was bid up 12 points, selling at $124. This gave rise to rumors of a renewal of negotiations for a Southern iron consolidation.

Coppers were strong, Amalgamated selling up to $90. On the curb, Nevada Consolidated sold at $9¼, and Utah Copper at $26. Greene Consolidated Copper was high, ranging from $26¾ to $28 for the highest.

American Smelting & Refining kept on upward, closing at $155 for the common and $132½ for the preferred.

Very little was done in mining stocks on the Consolidated Exchange. The chief interest was in the Tonopah shares. Montana Tonopah sold at $2.40, and MacNamara at 44c. per share.

Boston. Nov. 28.

Continued activity has characterized this market the past week, while special stocks have soared in price. The steady advance in the price of copper is becoming alarming. Sales of the metal are reported at 17½c. for April delivery, which is the highest price since 1901; likewise the price of Amalgamated Copper, $90.50 today, is the highest for almost the same length of time. The most active and conspicuous stocks in this market have been Daly-West, North Butte, Utah, Boston Consolidated and United States Mining. Daly-West took a sudden start a few days ago and touched $22, closing tonight at $18.75, against $16.25 a week back. It seems that in October the mine earned $132,963 gross and $70,942 net; dividend requirements for the month amount to $36,000, which leaves surplus earnings of $34,942.

North Butte slid off $2.25 to $72.25, on free realizing, but rallied to $76.75 and closed tonight at $75.62½. The talk on this stock is as strong as ever. The bulk of the orders continue to come from the West. Utah was taken in hand and rushed up almost $9, touching $58.62½ and closing at $57.25. It is now said that the company is earning $7 per share and netting 12c. per pound on its copper; also it is declared the company has a $1,500,000 cash balance. The dividend, to be declared next month, is expected to be the regular $2 quarterly and $1 extra. Boston Consolidated closes $3.12½ higher than a week back at $21.75. United States became active Monday and touched $41.75 today, closing at $40.12½, against $38.62½ a week ago. Copper Range has been rather neglected, some disappointment being shown that the dividend has not been increased, although a larger amount is expected the next quarter. The directors have declared $1 payable Dec. 23.

Greene Consolidated is up $1.37½ to $28, and Mohawk rose $2.25 to $61.25 on expectation of a $2 dividend early next year. Old Dominion rose $3 to $33.50, on a bullish interview with Vice-president Smith, who has just returned from the mine. Parrot touched $29.75 on active trading for this stock and in sympathy with Anaconda, which touched $39.50. Nevada Consolidated touched $10 on the curb. Application has been made to list the 1,000,000-share capital on the Boston Stock Exchange. Keweenaw has also been a feature on the local curb, rising $9 to $19. If the present plans mature, the latter is bound to be a favorite through the connection of P. F. Cole, of North Butte fame. There are 150,000 shares; $5 has been paid in on 60,000 shares.

Colorado Springs. Nov. 24.

Activity shifted from the mines to the prospect list during the past week on the local exchange. Two strikes of considerable importance have been reported during the week, and this seems to have been the cause of the increase in values. A rich strike is reported as having been made in the Last Dollar mine on Bull hill, but that which affected the market most was the strike on the Banner property. The stock was selling one week ago for 3c., and advanced to 7⅛c. on today's market. In sympathy with this strike, adjoining properties to benefit are the Anchor and Mary Nevin, advancing 1¾ to 3¼c. and 6 to 7⅜c. respectively during the week.

The mines list has been rather quiet. El Paso is selling at 59½c.; Elkton was traded in but one day and today's quotation was 45@48½c. Findley is selling at 77¼c. Portland was traded in during the

week at $2.10@$2.20. Vindicator has been selling at 70c.; Isabella at 25½c. per share.

San Francisco. Nov. 23.

The Comstock shares have been very dull. Trading was light and prices correspondingly weak. Ophir sold down to $5.75; Consolidated California & Virginia, $1.55; Mexican, $1.40; Sierra Nevada, 40c. at the close.

The Tonopahs were much brighter, demand being good and prices quite strong. Montana Tonopah brought $2.35; Tonopah Belmont, $1.50; Tonopah Midway, $1.37; Sandstorm, 51c.; Bullfrog, of Nevada, 45c. per share.

Oil stocks were quiet, but a little broader trading was in evidence than for some weeks past. Kern Oil brought $10; Claremont, $1.12; Oil City, 75c.; all show advances.

Dividends.

Company.	Payable.	Rate.	Amt.
American Smelters B, pfd.	Dec. 1	$1.25	$375,000
Calumet & Arizona	Dec. 18	2.80	500,000
Calumet & Hecla	Dec. 20	15.00	1,500,000
Con. Mercur	Dec. 6	0.02½	25,000
Copper Range Con	Dec. 23	1.00	383,781
Federal Mng. and Sm.	Dec. 15	2.50	150,000
Federal Mng. and Sm., pfd.	Dec. 15	1.75	210,000
Gen. Chemical, pfd.	Jan. 2	1.50	150,000
International Salt	Dec. 1	1.00	187,500
Mexican Coal and Coke	Dec. 5	3.00	150,000
Mitchell		0 60	300,000
National Lead, pfd	Dec. 15	1.75	260,820
Old Dominion	Dec. 15	0.50	144,008
Republic Iron and S., pfd.	Jan. 2	3.12½	638,020
Rocco Homestake	Dec. 26	0.02	6,000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
Brunswick-Potosi	Dec. 13	Jan. 2	$0.03
Brunswick-Savage	Dec. 12	Dec. 2	0.03
Caledonia	Nov. 17	Dec. 8	0.10
Cedar Creek, Cal.	Dec. 24	.....	0.004
Challenge Con	Nov. 22	Dec. 13	0.10
Champion	Dec. 11	.....	0.50
Chollar	Dec. 18	Jan. 8	0.10
Con. New York	Dec. 15	Jan. 2	0.03
Confidence	Nov. 12	Dec. 4	0.20
Crown Point	Nov. 14	Dec. 5	0.10
Justice	Nov. 16	Dec. 9	0.05
Pearl Con., Wash		.....	0 002
Purington, Cal.	Dec. 26	.....	0.01
Segregated Belcher	Dec. 8	Dec. 28	0.05
South Eureka, Cal.	Nov. 25	.....	0.05
Spanish Ridge, Cal.	Dec. 18	.....	0.05
Union Con	Nov. 13	Dec. 4	0.10

St. Louis.

Nov. 25.

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.19	.12
Center Creek	2.00	1.50
Central Coal & Coke	62.50	61.25
" " " pfd.	80.50	79.00
Central Oil	60.00	55.00
Columbia	1.00	.25
Con. Coal	32.00	30.00
Doe Run	160.00	155.00
Granite Bimetallic	.25	.15
St. Joe	18.00	17.50

LONDON. (*By Cable.**) Nov. 22.

	£	s.	d.
Camp Bird	1	13	6
Consolidated Gold Fields	5	18	1¼
De Beers	17	17	6
Dolores	2	5	6
East Rand	6	8	9
El Oro	1	12	0
Esperanza	5	6	6
Modderfontein	7	1	3
Rand Mines	7	10	0
Rio Tinto	66	16	3
Simmer and Jack	1	10	3
Stratton's Independence	0	8	0
Tomboy	1	6	3

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Nov. 29.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	90⅜	85⅜	88⅞	669,007
Anaconda	158	143	155	107,100
British Col. Copper	8¾	7¾	8⅝	22,800
Federal	140	130½	140	1,000
Federal, Pf.	109½	107	109¼	26,350
Greene Copper	28	26⅛	27⅝	54,700
Greene Gold	4½	4⅛	4⅜	2,000
Mitchell	9	8⅝	9	2,100
Tennessee Copper	38	35¾	38	5,410
Union Copper	1⅜	1⅛	1⅜	6,700
United Copper,	34½	33⅛	33⅝	15,800
United Copper, Pref.	78¼	76½	77	1,508
Utah Apex	7	5⅛	6⅞	20,200

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	157⅛	149	152	352,750
Am. Smelting & Ref., Pf.	135¾	130½	132½	57,450
Colorado Fuel & Iron	49¾	44½	47⅞	71,120
National Lead	73½	51⅜	68¼	404,460
Pittsburg Coal	14⅛	14	13⅞	500
Pittsburg Coal, pf.	57	54	57	400
Republic I. & S.	33¾	27	31	227,110
Republic I. & S., Pf.	104	99	103	67,150
Tenn. C. & I.	129	100¾	123	238,440
U. S. Red. & Ref.	30¼	29	29¼	17,00
U. S. Red. & Ref., Pf.	71	69½	69½	1,900
U. S. Steel	38½	37¼	37⅝	297,195
U. S. Steel, Pf.	105⅞	103¼	104⅜	247,278
Standard Oil	700	675	676¾	826
Bethlehem Steel	31	30¼	30¾	4,900

BOSTON.

Allouez	44	44½	41¾	4,010
*Amalgamated	90½	85½	89	54,560
Atlantic	25⅜	23¼	25	7,129
Bingham	36	34¼	34¼	6,117
Boston Consolidated	22¾	18⅜	21⅜	45,952
Calumet & Hecla	650	674	676	24
§Centennial	29⅛	27¾	28	3,350
Mercur	.63	.60	.60	3,300
Copper Range	75	73¾	74½	10,811
Daly-West	22	16¾	19	3,008
Franklin	19	17½	18	6,030
Granby	10¾	9	10	9,140
*Green Con. Copper	28	26⅛	27¾	11.864
Isle Royale	24½	23⅛	23½	2,315
§Mass	10¼	9½	9⅝	1,110
Michigan	16¾	16½	16¾	5,777
Mohawk	61⅜	58½	60	4,939
North Butte	76⅞	72⅛	75⅜	31,430
Old Dominion	33¾	30	33	5,870
Osceola	110⅝	108	110	1,103
Parrot	29¾	27¾	29	4,722
Phoenix	1½	1⅜	1½	385
Rhode Island	7⅛	6¼	6¼	1,228
Shannon	8¼	7¾	7¾	4,090
Tamarack	130	125	128	465
Tecumseh	14⅝	13¾	13½	4,048
United Copper, com.	34½	33⅜	34	9,689
United States	42	38	40	34.959
Utah	58⅝	49¾	57	60,376
Wolverine	128	125	128	118

PHILADELPHIA.

Cambria Steel	29	27⅞	28⅜	6,615
Philadelphia Co	52⅜	51½	51⅞	8,803
Tonopah	13⅛	12⅞	13⅛	1,319

PITTSBURG.

Crucible Steel	13⅜	13	13	2,457
Crucible Steel, Pref.	68⅝	67¼	68½	2,589
Tonopah Ext.	5.75	5.60	5.75	2,285

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	45	45	45	45
El Paso	59¾	60	58½	60
Isabella	25¾	29¼	24¾	24¾
Portland	210	210	210	210
Vindicator	65	70	65	70

SAN FRANCISCO.

Best & Belcher	1.35	1.35	1.30	1.35
Bullion	.32	.33	.30	.32
Caledonia	.52	.69	.50	.69
Confidence	.80	.98	.80	.98
Con. Cal. & Va	1.55	1.55	1.45	1.45
Gould & Curry	.13	.15	.13	.15
Hale & Norcross	1.00	1.05	1.00	1.05
Mexican	1.35	1.35	1.30	1.30
Occidental Con	.86	.86	.86	.86
Ophir	5.62½	5.75	5.62½	5.62½
Savage	.50	.50	.47	.48

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	62.034	26.760	28.637
November	58.453	63.849	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.567
Oct.	12.993	16.279	13.118	16.332	60.012	71.406
Nov.	14.284	16.599	14.456	16.758	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
Mar.	28.317	29.523	Sept.	27.780	32.095
April	28.132	30.525	Oct	28.596	32.481
May.	27.718	30.049	Nov.	29.185	33.443
June.	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
Mar	4.475	4.470	Sept.	4.200	4.850
April	4.475	4.500	Oct	4.200	4.850
May	4.423	4.500	Nov.	4.200	5.200
June.	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	5.887	4.896	5.737	26.375
October	5.181	6.087	5.033	5.934	28.225
November	5.513	6.145	5.363	5.984	28.500
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

DIVIDENDS.

Gold, Silver, Lead, Quicksilver and Zinc Companies—U. S.

Name of Company and Location.		Author-ized Capital	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1.000,000	180.000	5	$1.239,381	Oct. 1905	$ .30
Alaska Treadwell, g.	Al'ka	5,000.000	200,000	25	9.060 000	Oct. 1905	1.00
Amalgamated, c,	Mont	155,000,000	1,530,879	100	32,745,129	Nov. 1905	1.25
Am.Sm.&Ref.,com.	U. S.	50,000,000	500.000	100	5 250 000	Oct. 1905	1.75
Am. Sm & Ref. pf.	U. S.	50,000 000	500 000	100	19,391.553	Oct. 1905	1.75
Am. Smelters, pf. A		17,000,000	170,000	100	255,000	Sept. 1905	1.50
Am. Smelters. pf. B		30,000,000	300.000	100	750,000	Dec. 1905	1.25
Anaconda,c.	Mont	30.000,000	1,200,000	25	26,850,000	Oct. 1905	1.25
Annie Laurie, g.	Utah.	5.000,000	25,000	100	465,061	July 1905	.50
Arizona, c.	Ariz	3,775 000			6,186,826	April 1905	
Atlantic, c	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
B. & H., l. z.	Mo	400.000	400,000	1	36,000	Oct. 1905	.01
Boston & Montana.	Mont	3 750,000	150,000	25	43 025,000	July 1905	10.00
Bunker Hill & Sull.	Ida	3,000,000	300 000	10	5 406,000	Nov. 1905	.60
Butte & Boston, c.	Mont	2 500,000	200,000	25	1.800,000	Feb. 1904	1.00
Calumet & Arizonac	Ariz	2 500,000	200.000	10	3.400.000	Dec. 1905	2.50
Calumet & Hecla,c.	Mich	2,500,000	10 0,000	25	92,350,000	Dec. 1905	15.00
Camp Bird, g.	Colo	5,500,000	820 000	5	2,050,104	May 1905	.18
Center Creek, l. z.	Mo	1.000 000	10 000	10	170 000	Oct. 1904	.10
Central Eureka, g.	Cal	4 000,000	400 000	10	643,159	July 1905	.07
Century, g. s. l.	Utah	150.000	150,000	1	30,000	July 1904	.02
C. K. & N., g	Colo.	1 500,000	1,431,900	1	229.104	Dec. 1904	.01
Con. Mercur, g.	Utah.	5 000 000	1,000,000	5	1,055,000	Dec. 1905	.02½
Continental, z.	Mo.	550,000	22 000	25	121 000	July 1905	.50
Copper Range.	Mich	2,500,300	100,000	25	150 000	Oct. 1905	1.50
Copper Range Con.	Mich	38.500 000	383 781	100	1,487,124	Dec. 1905	1.00
Creede United, g.	Colo.	1,625 000	1,625,000	1	173,428	July 1905	.02
Cripple Creek Con g	Colo.	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly West, g. s. l.	Utah.	3,600.000	180 000	20	4.859,000	Sept. 1905	.60
De Lamar, g. s	Ida	400 000	67.180	5	2,926,370	May 1905	.72
Dillon, g.	Colo.	1,250,000	1,250,000	1	21,875	July 1905	.01
Doe Run, l.	Mo.	1.500,000	15,000	100	752,072	Apr. 1905	1.50
Elkton Con., g.	Colo.	3 000,000	2,500 000	1	1,491 961	May 1905	.00½
El Paso, g.	Colo.	2.500,000	2 450,000	1	999 750	Nov. 1905	.01
Fed. Sm., com.	Idaho	10 000 000	60 000	100	753 750	Dec. 1905	2.50
Federal Sm., pf.	Idaho	20,000 000	120,000	100	1,548,750	Dec. 1905	1.75
Findley, g.	Colo.	1,250 000	1,250 000	1	50,000	May 1905	.01
Gemini-Keystone	Utah.	500,000	5 000	100	1.300,000	Aug. 1905	10.00
Gold King Con	Colo.	5 750 370	5,750.370	1	1,407 504	May 1905	.01
Gold Sovereign	Colo.	2,000 000	2,000,000	1	10 000	Jan. 1905	.00½
Grand Central, g.	Utah.	25 .000	250.000	1	1.031 250	Aug. 1905	.05
Hecla, s. l.	Idaho	250 000	1 000.000	25	350 000	Apr. 1905	.01
Homestake, g.	S. D	21 840,000	218.400	100	14,005,750	Nov. 1905	.50
HornSilver,g.s.c.z.l	Utah.	10,000 000	400,000	25	5,462 000	Mar. 1905	.05
Iron Silver.	Colo.	10.000,000	500,000	20	3.400,000	Nov. 1905	1.00
Jamison, g.	Cal	3 900 000	390,000	10	202,100	July 1905	.03
Jerry Johnson.	Cal	2,500,000	2,500,000	1	25,000	July 1905	.01
Kendall, g.	Mont	2,500.000	500 000	5	780.000	July 1905	.05
Liberty Bell, g.	Colo.	700.000	130,349	1	169,441	Oct. 1904	.15
Lightner, g.	Cal	125,000	102,255	1	295.694	Aug. 1905	.05
Lucky Budge, z.	Mo.	40.000	400	100	46,800	Apr. 1905	12.00
Lyon, z. l	Mo.	50 000	4.585	10	2 117	Jan. 1905	.20
Mammoth, g. s. l.	Utah.	10.000 000	400,000	25	1,980 000	Nov. 1904	.05
Mary McKinney, g.	Colo.	1 000,000	1.000,000	1	567,000	Oct. 1904	.03
Mines Co. of Am	U. S.	2,000,000	2,000,000	1	1,065,000	Aug. 1905	.01½
Mont. Ore Purch.	Mont	2,500 000	81.000	25	4,104 000	May 1905	4.00
Monument, g.	Colo.	300.000	300.000	1	27,124	Apr. 1905	.01
Nat'l Lead, pf	U. S.	15 000 000	149 040	100	14,607 600	Dec. 1905	1.75
Nevada Keystone, g	Nevada	1,000,000	638 877	1	61,790	Feb. 1904	.03
New Century. z	Mo.	150,000	150,000	1	21,000	July 1905	.02
New Idria, q	Cal	500 000	100,000	5	780,000	Oct. 1905	.20
New Jersey, z.	U. S.	10,000,000	100,000	100	8,100,000	Aug. 1905	3.00
North Butte	Mont				400,000	Sept. 1905	.50
North Star, g	Cal	2,500 000	250,000	10	931.356	July 1905	.30
Northern Light,g s	Utah.	2,000,000	400,000	5	20.000	Feb. 1904	.05
Old Dominion Cop.	Ariz.	7,500,000	288,000	25	144,000	Dec. 1905	.50
Old Gold	Colo.	2.101.150	2 101 150	1	10,506	Mar. 1904	.05
Ophir, g. s	Nevada	302,400	100.800	3	1,797.400	July 1904	.25
Osceola, c	Mich	2,500.000	96.150	25	4,821.200	July 1905	2.00
Parrot, c,s.	Mont	2,300,000	229,850	10	6,347,950	Sept. 1905	.50
Peacock Valley, l.z.	Mo.	25,000	2,500	10	47,500	May 1905	
Pennsylvania, g.	Cal	5,150,000	51,500	100	284.925	July 1905	.10
Penn-Wyoming	Wyo.	10,000,000	10000000	1	50,000	July 1905	.01½
Platteville, l. z.	Wis.	20 000	500	40	89,500	Oct. 1905	10.00
Portland, g.	Colo.	3,000,000	3,000,000	1	6,457.080	Nov. 1905	.10
Quicksilver, pf.	Cal	4,500,000	43.000	100	1,931.411	May 1903	.50
Quilp, g	Wash.	1 500 000	1,500,000	1	15 000	Apr. 1904	.01
Quincy, c	Mich	2,500,000	100,000	25	15,220 000	Aug. 1905	3.00
Red Bird, g. s. c. l.	Mont	1,500,000	300,000	5	72,000	Dec. 1904	.01
Rob Roy, z.	Mo.	15,000	14.325	1	3,375	Dec. 1904	.03
Rocco Homest'k,l.s.	Nevada	300,000	300.000	1	112 000	Dec. 1905	.02
Sacramento, g	Utah.	5,000,000	1,000,000	5	213,000	Aug. 1904	.01½
Salvator, g. s. l.	Utah.	200 000	200,000	1	6.500	Aug. 1904	.01
St. Joseph, l.	Mo.	6,000,000	375 000	10	4,059,500	Dec. 1904	.15
Silver Hill, g. s	Nevada	180,000	180 000	1	64 800	Nov. 1905	.05
Silver King, g. s. l.	Utah.	3,000,000	150,000	20	9,250 000	July 1905	.66⅔
South Swansea, g.s.	Utah.	300,000	300 000	1	170 500	Apr. 1904	.01
Spearfish. g	S. D.	1,500,000	1.500,000	1	165 500	Jan. 1905	.01½
Standard Con., g. s.	Cal	2.000,000	178,394	1	4,160,331	Sept. 1903	.10
Stratton'sIndepend	Colo.	5.500,000	1,000 007	10	4 505,863	May 1905	.12½
Tamarack, c	Mich	1.500 000	60,000	5	8.700,000	July 1905	2.00
Tennessee, c.	Tenn	5,000,000	175.000	25	437,500	Jan. 1904	1.25
Tomboy, g. s.	Colo.	1,500,000	300,000	25	1,316 000	Dec. 1904	.24
Tonopah of Nev.	Nevada	1,000,000	1,000,000	5	750,000	Oct. 1905	.25
Tonopah Ext'nsion	Nevada	1,000,000	1,0 0,000	1		Oct. 1905	.10
Uncle Sam	Utah.	200.000	200 000	1	75 000	July 1905	.01
United Cop., Com.	Mont	45,000,000	450,000	100	450,000	July 1905	1.00
United, c. pf	Mont	5 000.000	50 000	100	1,050,000	Nov. 1905	3.00
United, z. l, com	Mo.	5,000,000	92,400	5	27,450	Oct. 1903	.05
United, z. l., pf	Mo.	1.000.000	19 556	25	197,084	July 1905	.50
United (Crip'le C'k)	Colo.	5,000 000	4,009 100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz.	3,000.000	300 000	10	17,085.322	Dec. 1904	.75
United States,g.s.c.	Utah.	21 500,000	480,000	25	780,000	July 1905	.75
Utah, g.	Utah.	1,000 000	100,000	10	225 000	June 1904	.01
Utah Con., c.	Utah.	1,500,000	300,000	5	3,636,000	July 1905	2.00
Victoria, Utah	Utah.	250,000	250,000	1	17,500	Aug. 1905	.04
Vindicator Con., g.	Colo.	1 500,000	1,100,000	1	1.368,000	Nov. 1905	.03
Wolverine, c.	Mich	1,500,000	60,000	25	2,790,000	Oct. 1905	6.00
Work, g	Colo.	1,500,000	1,500,000	1	15,000	May 1905	.00½
Yankee Con.	Utah.	500,000	500,000	1	100 000	Aug. 1905	.05
Yellow Aster, g.	Cal	1,000,000	100,000	10	538,789	Feb. 1904	.15

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con. C. & I., pf.	Ala	$2,500,000	$24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U. S.	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Alma Oil	Cal.	400,000	400,000	1	57,600	Nov. 1904	.08
Amer. Ag Chem., pf.	U. S.	20,000,000	181,350	100	6,286,790	Apr. 1905	3.00
American Cement.	Pa.	2,000,000	200,000	10	820,000	July 1905	.30
American Coal.	Md.	1,500,000	50,000	25	1,682,500	Sept. 1905	1.25
Associated Oil.	Cal.	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa		150,000	100	262,500	Nov. 1905	1.75
Bon Air C. & I., pf.	Tenn.	2,500,000	18,803	100	249,757	Oct. 1904	1.50
Cambria Steel.	Pa.	50,000,000	900,000	50	9,150,000	Aug. 1905	.75
Caribou Oil.	al.	100.000	80,000	1	56,000	July 1905	.07
Central C & C., com.	Mo	5,125,000	51,250	100	1,166,250	Oct. 1905	1.50
Central C. & C., pf.	Mo.	1,875,000	18,750	100	984,370	Oct. 1905	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil.	Cal.	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C & I.	Ohio	7,000,000	69,244	100	173,086	Feb. 1905	.25
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal.	Md.	10,250,000	102,500	100	7,356,650	Feb. 1905	4.00
Empire S & I., pf.	N. J	5,000,000	23,700	100	498,000	July 1905	1.50
Esperanza Oil.	Cal.	125,000	125,000	1	2,500	Oct. 1904	.01
Fairmont Coal,	W. Va.	12,000,000	120,000	100	600,000	Feb. 1905	3.00
Four Oil	Cal.	500,000	300,000	1	105,406	July 1905	.01
General Chem. com.	U. S.	12,500,000	74,103	100	1,300,507	Dec. 1903	1.25
General Chem., pf.	U. S.	12,500,000	100,000	100	3,775,178	Jan. 1906	1.50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Home Oil.	Cal.	100,000	100,000	1	507,500	Oct. 1904	.02½
Ill. Crude Oil	Cal.	200,000	200,000	1	12,500	Dec. 1904	.01½
Imperial Oil	Cal.	1,000,000	100,000	100	880,000	July 1905	.20
Jeff & Cl'f C. & I., com.	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I., pf	Pa.	1,500,000	15,000	100	750,500	Aug. 1905	2.50
Kern River Oil.	Cal.	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	14.345,650	346,897	50	23 533.303	Nov. 1905	2.00
Maryland Coal,pf.	Md.	2,000,000	18,850	100	1,282,335	June 1905	3.50
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	2,960,945	Jan. 1905	.77
Monte Cristo Oil.	Cal.	500,000	500,000	1	120,000	July 1905	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	2,047,500	May 1905	1.75
New Central Coal	Md.	1,000,000	50,000	20	310,000	Nov. 1905	.40
Oil City Petroleum.	Cal.	500,000	500,000	1	55,000	July 1905	.00½
Pacific Coast Borax.	Cal.	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil.	al.	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt.	Pa.	3,000,000	60,000	50	13,988,000	Oct. 1905	3.00
Penna. Steel.	Pa.	25,000,000	168,214	100	5,849,497	Nov. 1905	3.50
Phila. Gas, com	Pa.	28,953,029	579,061	50	6,684,142	Nov. 1905	.75
Phila. Gas, pf.	Pa.	5,744,813	114,896	50	1,583,505	Mar. 1905	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	347,500	Aug. 1905	1.50
Republic I. & S., pfd.			204,169	100	436,369	Oct. 1905	1.75
Sloss-Sheffield, com.	Ala	7,500,000	75,000	100	375,250	Oct. 1905	2.50
Sloss-Sheffield, pf.	Ala	20,000,000	67,000	100	2,556,750	Oct. 1905	1.75
Somerset Coal.	Pa.	4,000,000	40,000	100	80,000	Feb. 1904	2.00
Standard Oil	U. S.	100,000,000	970,000	100	280,485,000	Oct. 1905	10.00
Tenn. C. & I., com.	Tenn.	22,553,600	225,536	100	1,778,750	Nov. 1905	1.00
Tenn. C. & I., pf.	Tenn.	248,000	2,480	100	355,284	Nov. 1905	2.00
Texas & Pacific Coal.	Texas.	2,000,000	20,000	100	1,930,000	Mar. 1905	2.00
Thirty-three Oil.	Cal.	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal.	10,000,000	100,000	100	1,118,766	May 1905	.50
Union National Gas	Pa.	9,000.000	90,000	100	1,260,000	Apr. 1905	2.00
U. S. Steel Corp., com.	U. S.	550,000,000	5,083,025	100	53,360,978	Dec. 1903	1.50
U. S. Steel Corp., pf.	U. S.	360,281,100	3,603,141	100	143,318,567	Nov. 1905	1.75
Va. Carolina Ch., com.	U. S.	38,000,000	279,844	100	3,678,829	June 1903	1.25
Va. Carolina Ch., pf.	U. S.	20,000,000	180,000	100	9,660,869	Oct. 1905	2.00
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex.	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Butters' Salvador, g.	Salv	750,000	150,000	5	600,000	Apr. 1905	.25
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Carmen, g. s.	Mex.	27,500	1,100	25	117,437	Jan. 1905	2.37
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	121,486	25	968,947	Apr. 1904	2.50
Dominion Coal, com.	N. S.	15,000,000	150,000	100	1,050,000	Dec. 1903	1.75
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	3,330,000	Jan. 190	4.00
Dos Estrellas g. s.	Mex	150,000	3,000	50	1,020,500	July 1905	13.65
El Oro, g. s.	Mex	5,750,000	1,080,000	5	2,706,800	July 1904	.15
Esperanza, s. g.	Mex	2,275,000	455,000	5	1,486,349	May 1905	.12
Granby Con.	B. C.	13,363,030	1,336,303	10	133,630	Dec. 1903	.10
Greene Con., copper.	Mex.	8,640,000	864,000	10	3,403,200	Oct. 1906	.40
Greene Con., gold.	Mex.	5,000,000	500,000	10	300,000	July 1905	.20
Guggenheim Expl.	Mex.	17,000,000	105,000	100	1,837,500	July 1905	1.75
LeRoi No. 2, g.	B. C.	3,000,000	120,000	25	432,000	Oct. 1905	.24
Mexican Coal & Coke	Mex.	5,000,000	50,000	100	600.000	Dec. 1905	3.00
N. Y. & Hond. Ros.	C. A.	1,500,000	150,000	10	2,077,500	Nov. 1905	.10
North Star.	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	50,000	100	788,600	Nov. 1904	2.00
N. S. St. & Coal, pf.	N. S.	2,000,000	10,300	100	309,000	Apr. 1905	2.00
Penoles.	Mex.		3,399,800		59,375	July 1905	23.75
Providence, g. s.	B. C.	200,000	40,000	5	22,224	Oct. 1904	.10
Reco, g. s. l.	B. C.	1,000,000	958,000	1	307,082	Apr. 1905	.02
Slocan Star.	B. C.	500,000	500,000	1	575,000	Dec. 1904	.05
St. John del Rey, g.	Brazil.	3,000,000	546,265	5	14,228,101	Dec. 1904	.12
St. Eugene Con.	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Tilt Cove, c.	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.24
Tyee, c	B. C.	940,000	180,000	5	136,800	Dec. 1904	.48